



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification <sup>7</sup> :</b> <b>C12N 15/31, C07K 14/315, 16/12, G01N 33/50, A61K 39/09, C12Q 1/68</b>	<b>A2</b>	<b>(11) International Publication Number:</b> <b>WO 00/06737</b> <b>(43) International Publication Date:</b> 10 February 2000 (10.02.00)
<b>(21) International Application Number:</b> PCT/GB99/02451 <b>(22) International Filing Date:</b> 27 July 1999 (27.07.99)  <b>(30) Priority Data:</b> 9816337.1                      27 July 1998 (27.07.98)                      GB 60/125,164                      19 March 1999 (19.03.99)                      US  <b>(71) Applicant (for all designated States except US):</b> MICROBIAL TECHNICS LIMITED [GB/GB]; 20 Trumpington Street, Cambridge CB2 1QA (GB).  <b>(72) Inventors; and</b> <b>(75) Inventors/Applicants (for US only):</b> GILBERT, Christophe, François, Guy [FR/GB]; University of Cambridge, Dept. of Pathology, Tennis Court Road, Cambridge CB1 1PQ (GB). HANSBRO, Philip, Michael [GB/GB]; University of Cambridge, Dept. of Pathology, Tennis Court Road, Cambridge CB2 1QP (GB).  <b>(74) Agents:</b> CHAPMAN, Paul, William et al.; Kilburn & Strobe, 20 Red Lion Street, London WC1R 4PJ (GB).		<b>(81) Designated States:</b> CN, JP, US, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).  <b>Published</b> <i>Without international search report and to be republished upon receipt of that report.</i>
<b>(54) Title:</b> STREPTOCOCCUS PNEUMONIAE PROTEINS AND NUCLEIC ACID MOLECULES  <b>(57) Abstract</b>  Novel protein antigens from <i>Streptococcus pneumoniae</i> are disclosed, together with nucleic acid sequences encoding them. Their use in vaccines and in screening methods is also described.		

**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece	ML	Mali	TR	Turkey
BG	Bulgaria	HU	Hungary	MN	Mongolia	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MR	Mauritania	UA	Ukraine
BR	Brazil	IL	Israel	MW	Malawi	UG	Uganda
BY	Belarus	IS	Iceland	MX	Mexico	US	United States of America
CA	Canada	IT	Italy	NE	Niger	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NL	Netherlands	VN	Viet Nam
CG	Congo	KE	Kenya	NO	Norway	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NZ	New Zealand	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	PL	Poland		
CM	Cameroon	KR	Republic of Korea	PT	Portugal		
CN	China	KZ	Kazakhstan	R	Romania		
CU	Cuba	LC	Saint Lucia	RU	Russian Federation		
CZ	Czech Republic	LI	Liechtenstein	SD	Sudan		
DE	Germany	LK	Sri Lanka	SE	Sweden		
DK	Denmark	LR	Liberia	SG	Singapore		
EE	Estonia						

## STREPTOCOCCUS PNEUMONIAE PROTEINS AND NUCLEIC ACID MOLECULES

The present invention relates to proteins derived from *Streptococcus pneumoniae*, nucleic acid molecules encoding such proteins, the use of the nucleic acid and/or proteins as antigens/immunogens and in detection/diagnosis, as well as methods for screening the proteins/nucleic acid sequences as potential anti-microbial targets.

*Streptococcus pneumoniae*, commonly referred to as the pneumococcus, is an important pathogenic organism. The continuing significance of *Streptococcus pneumoniae* infections in relation to human disease in developing and developed countries has been authoritatively reviewed (Fiber, G.R., *Science*, 265: 1385-1387 (1994)). That indicates that on a global scale this organism is believed to be the most common bacterial cause of acute respiratory infections, and is estimated to result in 1 million childhood deaths each year, mostly in developing countries (Stansfield, S.K., *Pediatr. Infect. Dis.*, 6: 622 (1987)). In the USA it has been suggested (Breiman *et al*, *Arch. Intern. Med.*, 150: 1401 (1990)) that the pneumococcus is still the most common cause of bacterial pneumonia, and that disease rates are particularly high in young children, in the elderly, and in patients with predisposing conditions such as asplenia, heart, lung and kidney disease, diabetes, alcoholism, or with immunosuppressive disorders, especially AIDS. These groups are at higher risk of pneumococcal septicaemia and hence meningitis and therefore have a greater risk of dying from pneumococcal infection. The pneumococcus is also the leading cause of otitis media and sinusitis, which remain prevalent infections in children in developed countries, and which incur substantial costs.

25

The need for effective preventative strategies against pneumococcal infection is highlighted by the recent emergence of penicillin-resistant pneumococci. It has been reported that 6.6% of pneumococcal isolates in 13 US hospitals in 12 states were found

to be resistant to penicillin and some isolates were also resistant to other antibiotics including third generation cyclosporins (Schappert, S.M., *Vital and Health Statistics of the Centres for Disease Control/National Centre for Health Statistics*, 214:1 (1992)). The rates of penicillin resistance can be higher (up to 20%) in some hospitals (Breiman *et al*, J. Am. Med. Assoc., 271: 1831 (1994)). Since the development of penicillin resistance among pneumococci is both recent and sudden, coming after decades during which penicillin remained an effective treatment, these findings are regarded as alarming.

For the reasons given above, there are therefore compelling grounds for considering improvements in the means of preventing, controlling, diagnosing or treating pneumococcal diseases.

Various approaches have been taken in order to provide vaccines for the prevention of pneumococcal infections. Difficulties arise for instance in view of the variety of serotypes (at least 90) based on the structure of the polysaccharide capsule surrounding the organism. Vaccines against individual serotypes are not effective against other serotypes and this means that vaccines must include polysaccharide antigens from a whole range of serotypes in order to be effective in a majority of cases. An additional problem arises because it has been found that the capsular polysaccharides (each of which determines the serotype and is the major protective antigen) when purified and used as a vaccine do not reliably induce protective antibody responses in children under two years of age, the age group which suffers the highest incidence of invasive pneumococcal infection and meningitis.

A modification of the approach using capsule antigens relies on conjugating the polysaccharide to a protein in order to derive an enhanced immune response, particularly by giving the response T-cell dependent character. This approach has



been used in the development of a vaccine against *Haemophilus influenzae*. There are issues of cost concerning both the multi-polysaccharide vaccines and those based on conjugates.

5

A third approach is to look for other antigenic components which offer the potential to be vaccine candidates. In the present application we provide a group of proteins antigens which are secreted/exported proteins.

10

Thus, in a first aspect the present invention provides a *Streptococcus pneumoniae* protein or polypeptide having a sequence selected from those shown in table 2 herein.

15

A protein or polypeptide of the present invention may be provided in substantially pure form. For example, it may be provided in a form which is substantially free of other proteins.

20

In a preferred embodiment, a protein or polypeptide having an amino acid sequence as shown in Table 3 is provided.

The invention encompasses any protein coded for by a nucleic acid sequence as shown in Table 1 herein.

25

As discussed herein, the proteins and polypeptides of the invention are useful as antigenic material. Such material can be "antigenic" and/or "immunogenic". Generally, "antigenic" is taken to mean that the protein or polypeptide is capable of being used to raise antibodies or indeed is capable of inducing an antibody response in a subject. "Immunogenic" is taken to mean that the protein or polypeptide is capable of

eliciting a protective immune response in a subject. Thus, in the latter case, the protein or polypeptide may be capable of not only generating an antibody response and in addition non-antibody based immune responses.

5

10 The skilled person will appreciate that homologues or derivatives of the proteins or polypeptides of the invention will also find use in the context of the present invention, ie as antigenic/immunogenic material. Thus, for instance proteins or polypeptides which include one or more additions, deletions, substitutions or the like are encompassed by the present invention. In addition, it may be possible to replace one amino acid with another of similar "type". For instance replacing one hydrophobic  
15 amino acid with another. One can use a program such as the CLUSTAL program to compare amino acid sequences. This program compares amino acid sequences and finds the optimal alignment by inserting spaces in either sequence as appropriate. It is possible to calculate amino acid identity or similarity (identity plus conservation of amino acid type) for an optimal alignment. A program like BLASTx will align the  
20 longest stretch of similar sequences and assign a value to the fit. It is thus possible to obtain a comparison where several regions of similarity are found, each having a different score. Both types of analysis are contemplated in the present invention.

25 In the case of homologues and derivatives, the degree of identity with a protein or polypeptide as described herein is less important than that the homologue or derivative should retain its antigenicity or immunogenicity to streptococcus pneumoniae. However, suitably, homologues or derivatives having at least 60% similarity (as discussed above) with the proteins or polypeptides described herein are provided.

Preferably, homologues or derivatives having at least 70% similarity, more preferably at least 80% similarity are provided. Most preferably, homologues or derivatives having at least 90% or even 95% similarity are provided.

5 In an alternative approach, the homologues or derivatives could be fusion proteins, incorporating moieties which render purification easier, for example by effectively tagging the desired protein or polypeptide. It may be necessary to remove the "tag" or it may be the case that the fusion protein itself retains sufficient antigenicity to be useful.

10

In an additional aspect of the invention there are provided antigenic fragments of the proteins or polypeptides of the invention, or of homologues or derivatives thereof.

For fragments of the proteins or polypeptides described herein, or of homologues or derivatives thereof, the situation is slightly different. It is well known that is possible to screen an antigenic protein or polypeptide to identify epitopic regions, ie those regions which are responsible for the protein or polypeptide's antigenicity or immunogenicity. Methods for carrying out such screening are well known in the art. Thus, the fragments of the present invention should include one or more such epitopic regions or be sufficiently similar to such regions to retain their antigenic/immunogenic properties. Thus, for fragments according to the present invention the degree of identity is perhaps irrelevant, since they may be 100% identical to a particular part of a protein or polypeptide, homologue or derivative as described herein. The key issue, once again, is that the fragment retains the antigenic/immunogenic properties.

25

Thus, what is important for homologues, derivatives and fragments is that they possess at least a degree of the antigenicity/immunogenicity of the protein or polypeptide from which they are derived.

Gene cloning techniques may be used to provide a protein of the invention in substantially pure form. These techniques are disclosed, for example, in J. Sambrook *et al Molecular Cloning* 2nd Edition, Cold Spring Harbor Laboratory Press (1989).

5 Thus, in a fourth aspect, the present invention provides a nucleic acid molecule comprising or consisting of a sequence which is:

- (i) any of the DNA sequences set out in Table 1 or their RNA equivalents;
- 10 (ii) a sequence which is complementary to any of the sequences of (i);
- (iii) a sequence which codes for the same protein or polypeptide, as those sequences of (i) or (ii);
- 15 (iv) a sequence which has substantial identity with any of those of (i), (ii) and (iii);
- (v) a sequence which codes for a homologue, derivative or fragment of a protein as defined in Table 1.

20

In a fifth aspect the present invention provides a nucleic acid molecule comprising or consisting of a sequence which is:

- (i) any of the DNA sequences set out in Table 4 or their RNA equivalents;
- 25 (ii) a sequence which is complementary to any of the sequences of (i);

(iii) a sequence which codes for the same protein or polypeptide, as those sequences of (i) or (ii);

(iv) a sequence which has substantial identity with any of those of (i), (ii) and (iii);

(v) a sequence which codes for a homologue, derivative or fragment of a protein as defined in Table 4.

10 The nucleic acid molecules of the invention may include a plurality of such sequences, and/or fragments. The skilled person will appreciate that the present invention can include novel variants of those particular novel nucleic acid molecules which are exemplified herein. Such variants are encompassed by the present invention. These may occur in nature, for example because of strain variation. For example, additions, 15 substitutions and/or deletions are included. In addition, and particularly when utilising microbial expression systems, one may wish to engineer the nucleic acid sequence by making use of known preferred codon usage in the particular organism being used for expression. Thus, synthetic or non-naturally occurring variants are also included within the scope of the invention.

20 The term "RNA equivalent" when used above indicates that a given RNA molecule has a sequence which is complementary to that of a given DNA molecule (allowing for the fact that in RNA "U" replaces "T" in the genetic code).

25 When comparing nucleic acid sequences for the purposes of determining the degree of homology or identity one can use programs such as BESTFIT and GAP (both from the Wisconsin Genetics Computer Group (GCG) software package) BESTFIT, for example, compares two sequences and produces an optimal alignment of the most

similar segments. GAP enables sequences to be aligned along their whole length and finds the optimal alignment by inserting spaces in either sequence as appropriate. Suitably, in the context of the present invention compare when discussing identity of nucleic acid sequences, the comparison is made by alignment of the sequences along  
5 their whole length.

Preferably, sequences which have substantial identity have at least 50% sequence identity, desirably at least 75% sequence identity and more desirably at least 90 or at least 95% sequence identity with said sequences. In some cases the sequence identity  
10 may be 99% or above.

Desirably, the term "substantial identity" indicates that said sequence has a greater degree of identity with any of the sequences described herein than with prior art nucleic acid sequences.

15

It should however be noted that where a nucleic acid sequence of the present invention codes for at least part of a novel gene product the present invention includes within its scope all possible sequence coding for the gene product or for a novel part thereof.

20 The nucleic acid molecule may be in isolated or recombinant form. It may be incorporated into a vector and the vector may be incorporated into a host. Such vectors and suitable hosts form yet further aspects of the present invention.

Therefore, for example, by using probes based upon the nucleic acid sequences  
25 provided herein, genes in *Streptococcus pneumoniae* can be identified. They can then be excised using restriction enzymes and cloned into a vector. The vector can be introduced into a suitable host for expression.

Nucleic acid molecules of the present invention may be obtained from *S.pneumoniae* by the use of appropriate probes complementary to part of the sequences of the nucleic acid molecules. Restriction enzymes or sonication techniques can be used to obtain appropriately sized fragments for probing.

5

Alternatively PCR techniques may be used to amplify a desired nucleic acid sequence. Thus the sequence data provided herein can be used to design two primers for use in PCR so that a desired sequence, including whole genes or fragments thereof, can be targeted and then amplified to a high degree. One primer will normally show a high  
10 degree of specificity for a first sequence located on one strand of a DNA molecule, and the other primer will normally show a high degree of specificity for a second sequence located on the complementary strand of the DNA sequence and being spaced from the complementary sequence to the first sequence.

15 Typically primers will be at least 15-25 nucleotides long.

As a further alternative chemical synthesis may be used. This may be automated. Relatively short sequences may be chemically synthesised and ligated together to provide a longer sequence.

20

In yet a further aspect the present invention provides an immunogenic/antigenic composition comprising one or more proteins or polypeptides selected from those whose sequences are shown in Tables 2-4, or homologues or derivatives thereof, and/or fragments of any of these. In preferred embodiments, the  
25 immunogenic/antigenic composition is a vaccine or is for use in a diagnostic assay.

In the case of vaccines suitable additional excipients, diluents, adjuvants or the like may be included. Numerous examples of these are well known in the art.

It is also possible to utilise the nucleic acid sequences shown in Table 1 in the preparation of so-called DNA vaccines. Thus, the invention also provides a vaccine composition comprising one or more nucleic acid sequences as defined herein. The  
5 use of such DNA vaccines is described in the art. See for instance, Donnelly *et al* ,  
*Ann. Rev. Immunol.*, 15:617-648 (1997).

As already discussed herein the proteins or polypeptides described herein, their homologues or derivatives, and/or fragments of any of these, can be used in methods  
10 of detecting/diagnosing *S.pneumoniae*. Such methods can be based on the detection  
of antibodies against such proteins which may be present in a subject. Therefore the  
present invention provides a method for the detection/diagnosis of *S.pneumoniae*  
which comprises the step of bringing into contact a sample to be tested with at least  
one protein, or homologue, derivative or fragment thereof, as described herein.  
15 Suitably, the sample is a biological sample, such as a tissue sample or a sample of  
blood or saliva obtained from a subject to be tested.

In an alternative approach, the proteins described herein, or homologues, derivatives  
and/or fragments thereof, can be used to raise antibodies, which in turn can be used  
20 to detect the antigens, and hence *S.pneumoniae*. Such antibodies form another aspect  
of the invention. Antibodies within the scope of the present invention may be  
monoclonal or polyclonal.

Polyclonal antibodies can be raised by stimulating their production in a suitable animal  
25 host (e.g. a mouse, rat, guinea pig, rabbit, sheep, goat or monkey) when a protein as  
described herein, or a homologue, derivative or fragment thereof, is injected into the  
animal. If desired, an adjuvant may be administered together with the protein. Well-  
known adjuvants include Freund's adjuvant (complete and incomplete) and aluminium



hydroxide. The antibodies can then be purified by virtue of their binding to a protein as described herein.

5 Monoclonal antibodies can be produced from hybridomas. These can be formed by fusing myeloma cells and spleen cells which produce the desired antibody in order to form an immortal cell line. Thus the well-known Kohler & Milstein technique (*Nature* 256 (1975)) or subsequent variations upon this technique can be used.

10 Techniques for producing monoclonal and polyclonal antibodies that bind to a particular polypeptide/protein are now well developed in the art. They are discussed in standard immunology textbooks, for example in Roitt *et al*, *Immunology* second edition (1989), Churchill Livingstone, London.

15 In addition to whole antibodies, the present invention includes derivatives thereof which are capable of binding to proteins etc as described herein. Thus the present invention includes antibody fragments and synthetic constructs. Examples of antibody fragments and synthetic constructs are given by Dougall *et al* in *Tibtech* 12 372-379 (September 1994).

20 Antibody fragments include, for example, Fab, F(ab')<sub>2</sub> and Fv fragments. Fab fragments (These are discussed in Roitt *et al* [*supra*] ). Fv fragments can be modified to produce a synthetic construct known as a single chain Fv (scFv) molecule. This includes a peptide linker covalently joining V<sub>H</sub> and V<sub>L</sub> regions, which contributes to the stability of the molecule. Other synthetic constructs that can be used include CDR  
25 peptides. These are synthetic peptides comprising antigen-binding determinants. Peptide mimetics may also be used. These molecules are usually conformationally restricted organic rings that mimic the structure of a CDR loop and that include antigen-interactive side chains.

Synthetic constructs include chimaeric molecules. Thus, for example, humanised (or primatised) antibodies or derivatives thereof are within the scope of the present invention. An example of a humanised antibody is an antibody having human  
5 framework regions, but rodent hypervariable regions. Ways of producing chimaeric antibodies are discussed for example by Morrison *et al* in PNAS, 81, 6851-6855 (1984) and by Takeda *et al* in Nature. 314, 452-454 (1985).

Synthetic constructs also include molecules comprising an additional moiety that  
10 provides the molecule with some desirable property in addition to antigen binding. For example the moiety may be a label (e.g. a fluorescent or radioactive label). Alternatively, it may be a pharmaceutically active agent.

Antibodies, or derivatives thereof, find use in detection/diagnosis of *S.pneumoniae*.  
15 Thus, in another aspect the present invention provides a method for the detection/diagnosis of *S.pneumoniae* which comprises the step of bringing into contact a sample to be tested and antibodies capable of binding to one or more proteins described herein, or to homologues, derivatives and/or fragments thereof.

20 In addition, so-called "Affibodies" may be utilised. These are binding proteins selected from combinatorial libraries of an alpha-helical bacterial receptor domain (Nord *et al* , ) Thus, Small protein domains, capable of specific binding to different target proteins can be selected using combinatorial approaches.

25 It will also be clear that the nucleic acid sequences described herein may be used to detect/diagnose *S.pneumoniae*. Thus, in yet a further aspect, the present invention provides a method for the detection/diagnosis of *S.pneumoniae* which comprises the

step of bringing into contact a sample to be tested with at least one nucleic acid sequence as described herein. Suitably, the sample is a biological sample, such as a tissue sample or a sample of blood or saliva obtained from a subject to be tested. Such samples may be pre-treated before being used in the methods of the invention.

5 Thus, for example, a sample may be treated to extract DNA. Then, DNA probes based on the nucleic acid sequences described herein (ie usually fragments of such sequences) may be used to detect nucleic acid from *S.pneumoniae*.

In additional aspects, the present invention provides:

10

(a) a method of vaccinating a subject against *S.pneumoniae* which comprises the step of administering to a subject a protein or polypeptide of the invention, or a derivative, homologue or fragment thereof, or an immunogenic composition of the invention;

15

(b) a method of vaccinating a subject against *S.pneumoniae* which comprises the step of administering to a subject a nucleic acid molecule as defined herein;

20

(c) a method for the prophylaxis or treatment of *S.pneumoniae* infection which comprises the step of administering to a subject a protein or polypeptide of the invention, or a derivative, homologue or fragment thereof, or an immunogenic composition of the invention;

25

(d) a method for the prophylaxis or treatment of *S.pneumoniae* infection which comprises the step of administering to a subject a nucleic acid molecule as defined herein;

(e) a kit for use in detecting/diagnosing *S.pneumoniae* infection comprising one

or more proteins or polypeptides of the invention, or homologues, derivatives or fragments thereof, or an antigenic composition of the invention; and

- 5 (f) a kit for use in detecting/diagnosing *S.pneumoniae* infection comprising one or more nucleic acid molecules as defined herein.

Given that we have identified a group of important proteins, such proteins are potential targets for anti-microbial therapy. It is necessary, however, to determine whether each individual protein is essential for the organism's viability. Thus, the  
10 present invention also provides a method of determining whether a protein or polypeptide as described herein represents a potential anti-microbial target which comprises inactivating said protein and determining whether *S.pneumoniae* is still viable, *in vitro* or *in vivo*.

15 A suitable method for inactivating the protein is to effect selected gene knockouts, ie prevent expression of the protein and determine whether this results in a lethal change. Suitable methods for carrying out such gene knockouts are described in Li *et al*, *P.N.A.S.*, 94:13251-13256 (1997).

20 In a final aspect the present invention provides the use of an agent capable of antagonising, inhibiting or otherwise interfering with the function or expression of a protein or polypeptide of the invention in the manufacture of a medicament for use in the treatment or prophylaxis of *S.pneumoniae* infection.

25 The invention will now be described with reference to the following examples, which should not be construed as in any way limiting the invention. The examples refer to the figures in which:

Figure 1: shows the results of various DNA vaccine trials; and

Figure 2: shows the results of further DNA vaccine trials.

### EXAMPLE 1

5

The Genome sequencing of *Streptococcus pneumoniae* type 4 is in progress at the

Institute for Genomic Research (TIGR, Rockville, MD, USA). Up to now, the whole sequence has not been completed or published. On 21<sup>st</sup> November 1997, the  
10 TIGR centre released some DNA sequences as contigs which are not accurate reflections of the finished sequence. These contigs can be downloaded from their Webster ([www@tigr.org](http://www@tigr.org)). We downloaded these contigs and created a local database using the application GCGToBLAST (Wisconsin Package Version 9.1, Genetics Computer Group (GCG), Madison, USA). This database can be searched with the  
15 FastA and TfastA procedures (using the method of Pearson and Lipman (*PNAS USA*, 85:2444-2448 (1988))).

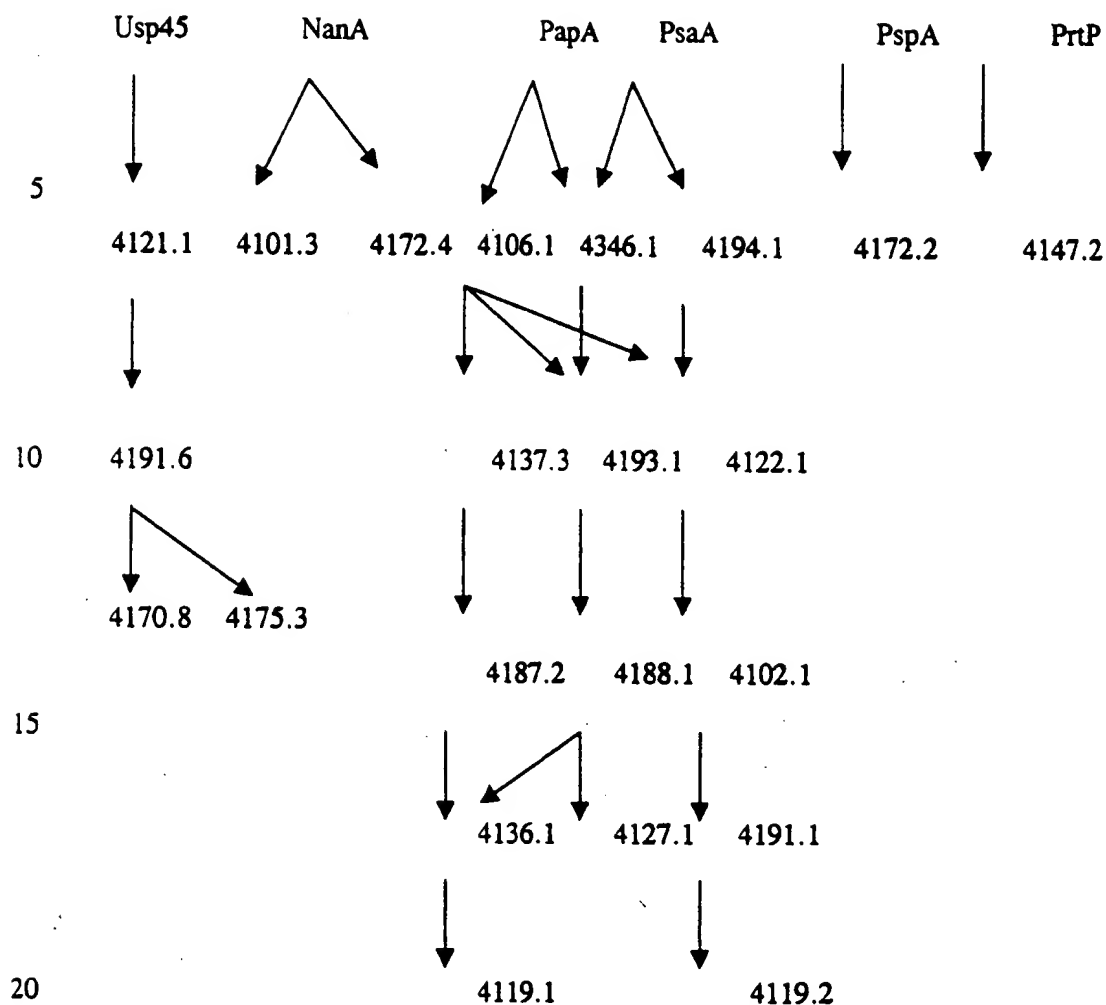
Using FastA and TfastA procedures, the local pneumococcus database was searched for putative leader sequence or anchor sequence features. Relevant sequences were  
20 used to interrogate for comparative novel sequences. These were:

- (i) already described leader sequences of *Streptococcus pneumoniae* (from proteins NanA, NanB, LytA, PapA, pcpA, PsaA and PspA);
- 25 (ii) the leader sequence of Usp45, a secreted protein from *Lactococcus lactis*;
- (iii) new hypothetical leader sequences derived from the searches in (i) and (ii);

(iv) the anchor motif LPxTG, a feature common to many Gram-positive bacteria surface proteins which are anchored by a mechanism involving the Sortase complex proteins.

5

Provided below is an example of this approach, with reference to the sequences derived from the database (see table 1).



The protein leader sequences of different known exported proteins were used as a starting point for a search of the local pneumococcus database described above. The hypothetical proteins found with this search were then submitted to a Blast search in general databases such as EMBL, Swissprot etc. Proteins remaining unknown in the pneumococcus are kept and annotated. Then the search is performed again using the new potential protein leader sequence as a probe, using the TfastA procedure.

## Example 2: DNA vaccine trials

### pcDNA3.1+ as a DNA vaccine vector

#### 5     pcDNA3.1+

The vector chosen for use as a DNA vaccine vector was pcDNA3.1 (Invitrogen) (actually pcDNA3.1+, the forward orientation was used in all cases but may be referred to as pcDNA3.1 here on). This vector has been widely and successfully  
10 employed as a host vector to test vaccine candidate genes to give protection against pathogens in the literature (Zhang, *et al.*, Kurar and Splitter, Anderson *et al.*). The vector was designed for high-level stable and non-replicative transient expression in mammalian cells. pcDNA3.1 contains the ColE1 origin of replication which allows convenient high-copy number replication and growth in *E. coli*. This in turn allows  
15 rapid and efficient cloning and testing of many genes. The pcDNA3.1 vector has a large number of cloning sites and also contains the gene encoding ampicillin resistance to aid in cloning selection and the human cytomegalovirus (CMV) immediate-early promoter/enhancer which permits efficient, high-level expression of the recombinant protein. The CMV promoter is a strong viral promoter in a wide  
20 range of cell types including both muscle and immune (antigen presenting) cells. This is important for optimal immune response as it remains unknown as to which cells types are most important in generating a protective response *in vivo*. A T7 promoter upstream of the multiple cloning site affords efficient expression of the modified insert of interest and which allows *in vitro* transcription of a cloned gene in  
25 the sense orientation.

Zhang, D., Yang, X., Berry, J. Shen, C., McClarty, G. and Brunham, R.C. (1997) "DNA vaccination with the major outer-membrane protein genes induces acquired immunity to *Chlamydia trachomatis* (mouse pneumonitis) infection". *Infection and Immunity*, 176, 1035-40.  
30

Kurar, E. and Splitter, G.A. (1997) "Nucleic acid vaccination of *Brucella abortus* ribosomal L7/L12 gene elicits immune response". *Vaccine*, 15, 1851-57.

35 Anderson, R., Gao, X.-M., Papakonstantinopoulou, A., Roberts, M. and Dougan, G. (1996) "Immune response in mice following immunisation with DNA encoding fragment C of tetanus toxin". *Infection and Immunity*, 64, 3168-3173.

#### Preparation of DNA vaccines

40

Oligonucleotide primers were designed for each individual gene of interest derived using the LEEP system. Each gene was examined thoroughly, and where possible,



primers were designed such that they targeted that portion of the gene thought to encode only the mature portion of the gene protein. It was hoped that expressing those sequences that encode only the mature portion of a target gene protein, would facilitate its correct folding when expressed in mammalian cells. For example, in the majority of cases primers were designed such that putative N-terminal signal peptide sequences would not be included in the final amplification product to be cloned into the pcDNA3.1 expression vector. The signal peptide directs the polypeptide precursor to the cell membrane via the protein export pathway where it is normally cleaved off by signal peptidase I (or signal peptidase II if a lipoprotein). Hence the signal peptide does not make up any part of the mature protein whether it be displayed on the surface of the bacteria surface or secreted. Where a N-terminal leader peptide sequence was not immediately obvious, primers were designed to target the whole of the gene sequence for cloning and ultimately, expression in pcDNA3.1.

Having said that, however, other additional features of proteins may also affect the expression and presentation of a soluble protein. DNA sequences encoding such features in the genes encoding the proteins of interest were excluded during the design of oligonucleotides. These features included:

1. LPXTG cell wall anchoring motifs.
2. LXXC lipoprotein attachment sites.
3. Hydrophobic C-terminal domain.
4. Where no N-terminal signal peptide or LXXC was present the start codon was excluded.
5. Where no hydrophobic C-terminal domain or LPXTG motif was present the stop codon was removed.

Appropriate PCR primers were designed for each gene of interest and any and all of the regions encoding the above features was removed from the gene when designing these primers. The primers were designed with the appropriate enzyme restriction site followed by a conserved Kozak nucleotide sequence (in all cases) GCCACC was used. The Kozak sequence facilitates the recognition of initiator sequences by eukaryotic ribosomes) and an ATG start codon upstream of the insert of the gene of interest. For example the forward primer using a BamHI site the primer would begin GCGGGATCCGCCACCATG followed by a small section of the 5' end of the gene of interest. The reverse primer was designed to be compatible with the forward primer and with a NotI restriction site at the 5' end in all cases (this site is TTGCGGCCGC).

#### PCR primers

The following PCR primers were designed and used to amplify the truncated genes of interest.

5

ID210

Forward Primer 5' CGGATCCGCCACCATGTCTTCTAATGAATCTGCCGATG  
3'

10

Reverse Primer 5' TTGCGGCCGCCTGTTTAGATTGGATATCTGTAAAGACTT  
3'

4172.5

15

Forward Primer 5'  
CGCGGATCCGCCACCATGGATTTTCCTTCAAATTTGGAGG 3'  
Reverse Primer 5' TTGCGGCCGCACCGTACTGGCTGCTGACT 3'

ID211

20

Forward Primer 5'  
CGGATCCGCCACCATGAGTGAGATCAAAATTATTAACGC 3'  
Reverse Primer 5' TTGCGGCCGCGTTCATGGTTGACTCCT 3'

25

4197.4

Forward Primer 5' CGCGGATCCGCCACCATGTGGGACATATTGGTGGAAAC  
3'

Reverse Primer 5' TTGCGGCCGCTTCACTTGAGCAAACCTGAATCC 3'

30

4122.1

Forward Primer 5'  
CGCGGATCCGCCACCATGTCACAAGAAAAACAAAAAATGAA 3'

35

Reverse Primer 5' TTGCGGCCGCATCGACGTAGTCTCCGCC 3'

4126.7

Forward Primer 5'  
CGCGGATCCGCCACCATGCTGGTTGGAACCTTCTACTATCAAT 3'  
Reverse Primer 5' TTGCGGCCGCAACTTTCGTCCCTTTTGG 3'

40

4188.11

Forward Primer 5' CGCGGATCCGCCACCATGGGCAATTCTGGCGGAA 3'

Reverse Primer 5' TTGCGGCCGCTTGTTTCATAGCTTTTTTGATTGTT 3'

5

ID209

Forward Primer 5'

CGCGGATCCGCCACCATGCTATTGATACGAAATGCAGGG 3'

10

Reverse Primer 5' TTGCGGCCGCAACATAATCTAGTAAATAAGCGTAGCC 3'

ID215

Forward Primer 5' CGCGGATCCGCCACCATGACGGCGACGAATTTTC 3'

15

Reverse Primer 5' TTGCGGCCGCTTAATTCGTTTTTGAAGTAGTTGCT 3'

4170.4

Forward Primer 5'

20

CGCGGATCCGCCACCATGGCTGTTTTCTTCGCTATCATG 3'

Reverse Primer 5' TTGCGGCCGCTTCTTCAACAAACCTTGTTCTTG 3'

4193.1

25

Forward Primer 5'

CGCGGATCCGCCACCATGGGTAACCGCTCTTCTCGTAAC 3'

Reverse Primer 5' TTGCGGCCGCGCTTCCATCAAGGATTTTAGC 3'

### Cloning

30

The insert along with the flanking features described above was amplified using PCR against a template of genomic DNA isolated from type 4 *S. pneumoniae* strain 11886 obtained from the National Collection of Type Cultures. The PCR product was cut with the appropriate restriction enzymes and cloned in to the multiple cloning site of pcDNA3.1 using conventional molecular biological techniques. Suitably mapped clones of the genes of interested were cultured and the plasmids isolated on a large scale (> 1.5 mg) using Plasmid Mega Kits (Qiagen). Successful cloning and maintenance of genes was confirmed by restriction mapping and sequencing ~ 700 base pairs through the 5' cloning junction of each large scale preparation of each construct.

40

### Strain validation

5 A strain of type 4 was used in cloning and challenge methods which is the strain from which the *S. pneumoniae* genome was sequenced. A freeze dried ampoule of a homogeneous laboratory strain of type 4 *S. pneumoniae* strain NCTC 11886 was obtained from the National Collection of Type Strains. The ampoule was opened and the cultured re suspended with 0.5 ml of tryptic soy broth (0.5% glucose, 5% blood). The suspension was subcultured into 10 ml tryptic soy broth (0.5% glucose, 5% blood) and incubated statically overnight at 37°C. This culture was streaked on to 5% blood agar plates to check for contaminants and confirm viability and on to blood agar slopes and the rest of the culture was used to make 20% glycerol stocks. The slopes were sent to the Public Health Laboratory Service where the type 4 serotype was confirmed.

15 A glycerol stock of NCTC 11886 was streaked on a 5% blood agar plate and incubated overnight in a CO<sub>2</sub> gas jar at 37°C. Fresh streaks were made and optochin sensitivity was confirmed.

#### Pneumococcal challenge

20 A standard inoculum of type 4 *S. pneumoniae* was prepared and frozen down by passaging a culture of pneumococcus 1x through mice, harvesting from the blood of infected animals, and grown up to a predetermined viable count of around 10<sup>9</sup> cfu/ml in broth before freezing down. The preparation is set out below as per the flow chart.

25

Streak pneumococcal culture and confirm identity

↓  
V

30

Grow over-night culture from 4-5 colonies on plate above

↓  
V

35

Animal passage pneumococcal culture  
(i.p. injection of cardiac bleed to harvest)

↓  
V

40

Grow over-night culture from animal passaged pneumococcus

- ↓  
V
- 5      Grow day culture (to pre-determined optical density) from over-night of animal passage and freeze down at -70°C - This is standard minimum
- ↓  
V
- 10      Thaw one aliquot of standard inoculum to viable count
- ↓  
V
- 15      Use standard inoculum to determine effective dose (called Virulence Testing)
- ↓  
V
- 20      All subsequent challenges - use standard inoculum to effective dose
- An aliquot of standard inoculum was diluted 500x in PBS and used to inoculate the mice.
- 25      Mice were lightly anaesthetised using halothane and then a dose of  $1.4 \times 10^5$  cfu of pneumococcus was applied to the nose of each mouse. The uptake was facilitated by the normal breathing of the mouse, which was left to recover on its back.
- 30      *S. pneumoniae* vaccine trials
- Vaccine trials in mice were carried out by the administration of DNA to 6 week old CBA/ca mice (Harlan, UK). Mice to be vaccinated were divided into groups of six and each group was immunised with recombinant pcDNA3.1+ plasmid DNA containing a specific target-gene sequence of interest. A total of 100 µg of DNA in Dulbecco's PBS (Sigma) was injected intramuscularly into the tibialis anterior muscle of both legs (50 µl in each leg). A boost was carried using the same procedure 4 weeks later. For comparison, control groups were included in all vaccine trials. These control groups were either unvaccinated animals or those administered with non-recombinant pcDNA3.1+ DNA (sham vaccinated) only, using the same time course described above. 3 weeks after the second immunisation, all mice groups were challenged intra-nasally with a lethal dose of *S. pneumoniae*
- 35
- 40

serotype 4 (strain NCTC 11886). The number of bacteria administered was monitored by plating serial dilutions of the inoculum on 5% blood agar plates. A problem with intranasal immunisations is that in some mice the inoculum bubbles out of the nostrils, this has been noted in results table and taken account of in calculations. A less obvious problem is that a certain amount of the inoculum for each mouse may be swallowed. It is assumed that this amount will be the same for each mouse and will average out over the course of inoculations. However, the sample sizes that have been used are small and this problem may have significant effects in some experiments. All mice remaining after the challenge were killed 3 or 4 days after infection. During the infection process, challenged mice were monitored for the development of symptoms associated with the onset of *S. pneumoniae* induced-disease. Typical symptoms in an appropriate order included piloerection, an increasingly hunched posture, discharge from eyes, increased lethargy and reluctance to move. The latter symptoms usually coincided with the development of a moribund state at which stage the mice were culled to prevent further suffering. These mice were deemed to be very close to death, and the time of culling was used to determine a survival time for statistical analysis. Where mice were found dead, the survival time was taken as the last time point when the mouse was monitored alive.

#### Interpretation of Results

A positive result was taken as any DNA sequence that was cloned and used in challenge experiments as described above which gave protection against that challenge. Protection was taken as those DNA sequences that gave statistically significant protection (to a 95% confidence level ( $p < 0.05$ )) and also those which were marginal or close to significant using Mann-Whitney or which show some protective features for example there were one or more outlying mice or because the time to the first death was prolonged. It is acceptable to allow marginal or non-significant results to be considered as potential positives when it is considered that the clarity of some of the results may be clouded by the problems associated with the administration of intranasal infections.

Results for vaccine trials 2, 7 and 8 (see figure 1)

	Mean survival times (hours)								
Mouse number	Unvacc control (2)	ID210 (2)	Unvacc control (7)	4172.5 (7)	Unvacc control (8)	ID211 (8)	4197.4 (8)	4122.1 (8)	4126.7 (8)
1	49.0	55.0	59.6	72.6	45.1	102.3T	60.1	50.6	60.0
2	51.0	46.5	47.2	67.9	50.8	55.5	54.9	77.2	60.0
3	49.0	49.0	59.6	54.4	60.4	60.6*	68.4	60.3	54.8
4	55.0	59.0	70.9	75.3	55.2	45.3	60.1	50.6	52.6
5	49.0	55.0	68.6*	70.9	45.1	55.5	54.9	50.6*	54.8
6	49.0	49.0	76.0	75.3	45.1	102.3T	52.7	44.9	60
Mean	50.3	52.3	63.6	69.4	50.2	70.2	58.5	55.7	57.0
sd	2.4	4.8	10.3	7.9	6.4	25.3	5.7	11.6	3.4
p value	-	0.3333	-	0.2104	-	0.0215	0.0621	0.4038	0.0833
1									

\* - bubbled when dosed so may not have received full inoculum.

T - terminated at end of experiment having no symptoms of infection.

Numbers in brackets - survival times disregarded assuming incomplete dosing

p value 1 refers to significance tests compared to unvaccinated controls

Statistical Analyses.

Trial 2 - The group vaccinated with ID210 also had a longer mean survival time than the unvaccinated controls but the results are not statistically significant.

Trial 7 - The group vaccinated with 4172.5 showed much greater survival times than unvaccinated controls although the differences were not statistically significant.

Trial 8 - The group vaccinated with ID211 survived significantly longer than unvaccinated controls. 4197.4, 4122.1 and 4126.7 vaccinated groups showed longer mean survival times than the unvaccinated group but the results were not statistically significant. The 4197.4 and 4126.7 groups also showed a prolonged time to the first death and the 4122.1 group showed 1 outlying result.



**Results of pneumococcal challenge DNA vaccination trials 9-11**  
(see figure 2)

Mouse number	Mean survival times (hours)									
	Unvacc control (9)	4188.1 1 (9)	ID209 (9)	Unvacc control (10)	pcDNA3.1 + (10)	ID215 (10)	4170.4 (10)	Unvacc control (11)	pcDNA3.1 + (11)	4193.1 (11)
1	(98.5)T	69.4	60.2	68.4	58.6	79.2	68.1	60.0	53.2	54.8
2	53.4	53.7	60.2	59.0	58.6	54.2	58.6	50.0	50.4	54.8
3	53.4	51.2	60.2	59.0	50.8	(103.2)*T	50.9	60.0	55.4	68.7*
4	53.4	75.0	(98.0)*T	45.1*	58.6	58.8	72.1	55.0	60.6	54.8
5	70.8	51.2	60.2	68.4	46.5	68.3	68.1	60.0	50.4	68.7
6	53.4	61.2	52.9	59.0	48.9	58.8	54.0	50.0	60.6	68.7*
Mean	56.9	60.3	58.8	59.8	53.6	63.9	62.0	55.8	55.1	61.7
Sd	7.8	10.0	3.3	8.5	5.6	10.0	8.7	5.0	4.6	7.6
p value 1	-	0.3894	0.2519	-	0.0307	<30.0	<39.0	-	-	0.1837
p value 2	-	-	-	-	-	0.0168	0.0316	-	-	0.0829

\* - bubbled when dosed so may not have received full inoculum.

T - terminated at end of experiment having no symptoms of infection.

Numbers in brackets - survival times disregarded assuming incomplete dosing

p value 1 refers to significance tests compared to unvaccinated controls

p value 2 refers to significance tests compared to pcDNA3.1 + vaccinated controls

Statistical Analyses.

Trial 9 - Although not statistically significant the groups vaccinated with 4188.11 and ID209 did have noticeably higher mean survival times than unvaccinated controls.

Trial 10 - The unvaccinated control group survived for a significantly longer period than the pcDNA3.1 + vaccinated group. The groups vaccinated with ID215 and 4170.4 showed statistically significant longer survival times compared to the sham vaccinated group ( $p=0.0168$  and  $0.0316$ ) but not compared to the unvaccinated group.

Trial 11 - The group vaccinated with 4193.1 was the most promising and survived an average of 6.5 hours longer than the pcDNA3.1 + vaccinated group and 6 hours longer than the unvaccinated group although the results were not statistically significant.

Table 1

4101.1	
5	ATGGAAGAGTTAGTGACCTTAGATTGTTTGTATTGACAGAACTAAGATTGAAGCCAATGCCAACAGTATAGTT TTGTGTGGAAGAAAACGACAGAGAAATCTCCGCCAACTTCAAGAACAGATACAGGTCTATTTTCAAGAAGAAA TCACTCCCTTCTGATTAAATATGCCATGTTTGATAAGAAACAAAAGAGAGGGTATAAAGAGTCAGCTAAAACT TAGCGAATTGGCACTATAATGACAAGGAGGATAGCTACACACATCCTGATGGCTGGTATTATCGTTTACCACATAC CAAAATATCAGAAAACACAGACAGACTTTCAACAGAAATCAAGGTTTACTACGCCGACGAACCTGAATCAGCCCC 10 TCAAAAGGGACTGTATATGAACGAACGCTATCAAACTTGAAGCTAAAGAATGTCAGGCGCTTTATCTCCCCA AGGTAGACAGATTTTCGCTCAACGCAAGATTGATGTGGAACCTGTCTTTGGGCAGATAAAGGCTCTTTGGGTTAC AAGAGATGTAATCTGAGAGGGAAGCGTCAAGTGAGAATTGACATGGGATTGGTACTTATGGCCAATAACCTCCTA AAATATAGTAAATGAAATAA
4101.3	
15	ATGGGGAAGGCCATTGGAATCGGAAAAGAGTTTATAGCATTGTAAGTTTCTGTGGGAGCTTGCTCAGTAATG ATTGGGACTTGTGAGTTTATTAGGAGGAAATATAGCTGGAGAATCTGTAGTTTATGCGGATGAAACACTTATTA CTCATACTGCTGAGAAACCTAAAGAGGAAAAATGATAGTAGAAGAAAAGGCTGATAAAGCTTTGGAACTAAA AATATAGTTGAAAGGACAGAACAAAGTGAACCTAGTTCAACTGAGGCTATTGCATCTGAGAAGAAAAGATGAA GCCGTAACCTCAAAAGAGGAAAAAGTGTCTGTAACCGGAAGAAAAAGCTCCAAGGATAGAATCAAGCTTC 20 AAATCAAGAAAAACCGCTCAAGGAAGATGCTAAAGCTGTAAACAAATGAAGAAGTGAATCAAAATGATTGAAGACA GGAAAGTGGATTTTAAATCAAAATTTGTAATTTAACTCAATGCAAAATCTAAGGAAGCCATTAAACCTGATGCAG ACGTATCTACGTGGAAGAAAAATTAGATTACCGTATGACTGGAGTATCTTAAACGATTTTCGATCATGAATCTCTGC ACAAAAATGAAGGTGGACAGCTCAACGGTGGGGAAGCTTGGTATCGCAAGACTTTCAACTAGATGAAAAAGACCT CAAGAAAAATGTTTCGCTTACTTTTGTGGCGTCTACATGGATTCTCAAGTTTATGTCAATGGTCAGTTAGTGGGG 25 CATTATCCAAATGGTTATAACCAGTTCTCATATGATATCACCAAAATACCTTCAAAAAGATGGTCGTGAGAAATGTGA TTGCTGTCCATGCAGTCAACAAACAGCCAAGTAGCCGTTGGTATTCAGGAAGTGGTATCTATCGTGATGTGACTTT ACAAGTGACAGATAAAGGTGCATGTTGAGAAAAATGGGACAACTATTTTAAACCAAACTTGAAGAACAACAACA TGCCAAGGTTGAAACTCATGTGACCAGCAAAATCGTCAATACGGACGACAAAGACCATGAACTTGTAGCCGAATA TCAAAATCGTTGAACGAGGTGGTCACTGTGTAACAGGCTTAGTTTCGTACAGCGAGTCGTACCTTAAAGACACATGA 30 ATCAACAAGCTAGATGCGATTTTGAAGATTGAAGACCAAACTGGAAGTGTTTTAAATGACAAAGCTGCTTG TACGAATTGATTACGCGTGTACCGTGACGGTCAATTTGGTTGATGCTAAGAAGGATTGTTTGGTTACCGTTACT ATCACTGGACTCCAAATGAAGGTTTCTCTTTGAATGGTGAACGTATTAATTCATGGAGTATCCTTGCAACACGA CCATGGGGCGCTTGGAGCAGAAGAAAACTATAAAGCAGAATATCGCCGCTCTCAAAACAAATGAAGGAGATGGGAG 35 TTAACCTCCATCCGTACAACCCACAACCGTGTAGTGAGCAAACTTGCAAATCGCAGCAGAACTAGGTTTACTCGT TCAGGAAGAGGCCCTTGATACGTGGTATGGTGGCAAGAAACCTTATGACTATGGACGTTTCTTTGAAAAAGATGC CACTCACCCAGAAAGCTCGAAAAGGTGAAAAATGGTCTGATTTGACCTACGTACCATGGTTCGAAAGAGGCAAAAA CAACCTCTATCTTCAATGTGGTCAATTTGGTAATGAATAGGTGAAGCTAATGGTGATGCCACTCTTTAGCAACT GTTAAACGTTTGGTTAAGGTTATCAAGGATGTTGATAAGACTCGCTATGTTACCATGGGAGCAGATAAATTCGTT 40 TCGGTAAATGGTAGCGGAGGGCATGAGAAAAATGCTGATGAATCGATGCTGTTGGATTTAACTATTTCTGAAGATA ATTACAAAGCCCTTAGAGCTAAGCATCAAAATGGTTGATTTATGGATCAGAAACATCTTCAGCTACCCGTACACG TGGAACTTACTATCGCCCTGAACGTGAATTGAACATAGCAATGGACCTGAGCGTAATTATGAACCTCAGATTA TGGAAATGATCGTGTGGGTGGGGGAAAAACAGCAACCGCTTCATGGACTTTTGACCGTGACAACGCTGGCTATGC TGGACAGTTTATCTGGACAGGTACGGACTATATTTGGTGAACTACACCATGGCACAACCAAAATCAAACTCTGTT 45 AAGAGCTCTTACTTTGGTATCGTAGATACAGCCGGCACTTCCAAAAACATGACTTCTATCTCTACCAAAAGCCAATGGG TTTCTGTTAAGAAGAAACCGATGGTACACCTCTCTCTCACTGGAACCTGGGAAAACAAAGAATTAGCATCCAAAG TAGCTGACTCAGAAGGTAAGATTCCAGTTCTGTGCTATTTCGAATGCTTCTAGTGTAGAAATGTTCTTGAATGGAAA ATCTCTTGGTCTTAAGACTTTCAATAAAAAACAAACAGCGATGGGCGGACTTACCAAGAAGGTGCAAAATGCTAA 50 TGAACCTTATCTTGAATGGAAAGTTGCCTATCAACCAAGTACCTTGGAAAGCAATTGCTCGTGATGAATCTGGCAAG GAAATTGCTCGAGATAAGATTACGACTGCTGGTAAGCCAGCGGACGTTCTGCTTATTAAGGAAGACCATGCGATT GCAGCAGATGGAAAAAGACTTGACTTACATCTACTATGAAATTTGTTGACAGCCAGGGGAATGTGGTTCCAACCTGCT AATAATCTGGTTTCGCTTCCAATTTGATGGCCAAAGGTCACTGGTGGTGTAGATAACCGAGAAACAAAGCCAGCCGT GAAAGCTATAAGGCGCAAGCAGATGGTTCTGGATTCTGTAAGCATTTAATGGTAAAGGTGTTGCCATTGTCAAAAT CAACTGAACAAGCAGGGAAATTCACCTGACTGCCCACTCTGATCTCTGAAATCGAACCAAGTCACTGTCTTTAC 55 TGGTAAGAAAGAAAGGACAAGAGAAGACTGTTTGGGGACAGAAAGTGCCAAAAGTACAGACCATTAATGGAGAGG CACCTGAAATGCCTACCACTGTTCCGTTTGTATACAGTGATGGTAGCCGTGACAGACGTCCTGTAACCTGGTCTTC AGTAGATGTGAGCAAGCCTGGTATTGTAACGGTGAAGGATGGCTGACGGACGAGAAAGTGAAGCTCGTGTAGA AGTGAATTGCTCTTAAATCAGAGCTACCAAGTTGTGAAACGTAATGCTCCAAATACTGACTTGAATCTGTAGACAAA TCTGTTTCTTATGTTTGTGATTGATGGAAGTGTGAAGAGTATGAAGTGGACAAGTGGGAGATTGCCGAAGAGATA AAGCTAAGTTAGCAATTCAGGTTCTCGTATTCAGCGACCGGTTATTTAGAAGGTCAACCAATTCATGCAACCT 60 TGTGGTGAAGAAAGGCAATCCTGCGGCACCTGCACTACCACTGTAACGGTTGGTGGTGAGGCGAGTAACAGGCT TACTAGTCAAAAAACCAATGCAATACCGCACTCTTGTCTATGGAGCTAAGTTGCCAGAAGTCACAGCAAGTGCTAA AAATGCAGCTGTTACAGTTCTTCAAGCAAGCGCAGCAACGGCATGCGTGCAGCATCTTATTACGCTAAAGA TGGTGGCCCTCTTCAACCTATGCAATTCATTCCTGAAGAGCGCCAAAAATGCTCACTTGAGCTTGCAAGTG GAAAAAGCTGACAGTCTCAAGAAGACCAACTGTCAAAATGTGCGTTTCAGCTCACTATCAAGATGGAACGCA

GCTGTATTACCAGCTGATAAAGTAACCTTCTCTACAAGTGGTGAAGGGGAAGTCGCAATTGCTAAAGGAATGCTT  
 GAGTTGCATAAGCCAGGAGCACTCTGAACGCTGAATATGAGGGAGCTAAAGACCAAGTTGAACCTCACTATC  
 CAAGCCAATACTGAGAAGAAGATTGCGCAATCCATCCGTCCTGTAATGTAGTGACAGATTTGCATCAGGAACCA  
 AGTCTTCCAGCAACAGTAACAGTTGAGTATGACAAAGGTTTCCCTAAAACCTCATAAAGTCACTTGGCAAGCTATT  
 5 CGAAAGAAAACTAGACTCCTATCAAACTTTGAAGTACTAGGTAAAGTTGAAGGAATTGACCTTGAAGCGCGTG  
 CAAAAGTCTCTGTAGAAGGTATCGTTTCAAGTTGAAGAAAGTCAGTGTGACAACTCCAATCGCAGAAAGCAACCAAT  
 TACCAGAAAGTGTTCGGACATATGATTCAAATGGTCACGTTTTCATCAGCTAAGGTTGCATGGGATGCGATTGCTCC  
 AGAGCAATACGCTAAGGAAGGTGTCTTTACAGTTAATGGTCGCTTGAAGGTACGCAATTAACTAACTTCA  
 10 TGTTCCGCTATCTGCTCAAACTGAGCAAGGTGCAAACTTTCTGACCAATGGACCGTTTCAAGATTGCCACTTGGC  
 TTTGCTTCAGACTCAAATCCAAGCGACCCAGTTTCAAATGTTAATGACAAGCTCATTCTCAATAACCAACCAG  
 CCAATCGTTGGACAACTGGAATCGTACTAATCCAGAAGCTTCAGTCGGTGTCTGTTTGGAGATTCAGGTATCTT  
 GAGCAACCGCTCCGTTGATAATCTAAGTGTCCGATTCCATGAAGACCATGGAGTTGGTGTACCGAAGTCTTATGTG  
 ATTAGATTATTGTTGGTAAGACTGTCCCAACAGTCTCTAAAAACCCTAGTTTGTGGTAAATGAGGACCATGTCT  
 15 TTAATGATTCTGCCAACTGGAACCAAGTTACTAATCTAAAAGCCCCTGCTCAACTCAAGGCTGGAGAAATGAACC  
 ACTTTAGCTTTGATAAAGTTGAAACCTATGCTGTTGCTATTCGATGGTTAAAGCAGATAACAAGCGTGGAAACGTC  
 TATCACAGAGGTACAAATCTTTGCGAAACAAGTTGCGGCAGCCAAGCAAGGACAAACAAGAAATCCAAGTTGACGG  
 CAAAGACTTAGCAAACTTCAACCCCTGATTTGACAGACTACTACCTTGAGTCTGTAGATGGAAAAGTTCCGGCAGTC  
 ACAGCAAGTGTAGCAACAATGGTCTCGCTACCGTCTGTTCCAAAGCGTTCGTGAAGGTGAGCCAGTTGCTGTCATCG  
 20 CGAAAGCTGAAAAATGGCGACATCTTAGGAGAATACCGTCTGCACTTCACTAAGGATAAGAGCTTACTTTCTCATA  
 AACCAGTTGCTCGGTTAAACAAGCTCGTTGCTACAAGTAGGTCAAGCACTTGAATTGCGGACTAAGGTTCCAGT  
 TTACTTTCACAGGTAAAGACGGCTACGAAACAAAAGACCTGACAGTTGAATGGGAAGAAGTTCCAGCGGAAAAATCT  
 GACAAAAGCAGGTCAATTTACTGTTGAGGCGGTGCTGTTGGTAGTAACCTTGTGCTGAGATCACTGTACGAGTG  
 ACAGCAAAACTTGGTGAGACTCTTTCAGATAACCTTAACATGATGAAAAACAGTAACCAGGCTTTGCTTCAGCA  
 25 ACCAATGATATTGACAAAACTCTCATGACCGGTTGACTATCTCAATGACGGAGATCATTGAGAAAATCGTCGT  
 GGACAACTGGTCAACCAACCATCTTCTAATCCAGAAGTATCAGCGGTGTGATTTCCGTGAAAAATGGTAAGA  
 TTGTAGAACGGACTGTACACAAGGAAAAAGTTCAAGTTCTTTGCAGATAGTGGTACGGATGCACCATCTAACTCGT  
 TTTAGAACGCTATGTGCGTCCAGAGTTTGAAGTGCCAACTACTATTCAAACTACCAAGCTACGACGACAGCCAT  
 CCATTCAACAATCCAGAAAAATGGGAAGCTGTTCTTATCGTGGGATAAAGACATTGCAGCTGGTGATGAAATC  
 AACGTAACTTTAAAGCTATCAAAGCCAAAGCTATGAGATGGCGTATGGAGCGTAAAGCAGATAAGAGCGGTGTT  
 30 GCGATGATTGAGATGACCTTCTTGCACCAAGTGAATGGCTCAAGAAAGCACTCAATCAAAGATTCTGTAGATG  
 GAAAAGAACTTGCTGATTTGCTGAAAAATCGTCAAGACTATCAAAATACCTATAAAGGTCAACGGCCAAAGTCT  
 CAGTTGAAGAAAACAATCAAGTAGCTTCAACTGTGGTAGATAGTGGAGAAGTAGCTTCCAGTACTTGTTCGCT  
 CGTTTCAGAAAGTGGAAAAACAAGTCAAGGAATACCGTATCCACTTGACTAAGGAA  
 35 AAACCAAGTTTCTGAGAAGACAGTTGCTGCTGTACAAGAAAGATCTTCCAAAAATCGAATTTGTTGAAAAAGATTTG  
 GCATACAAGACAGTTGAGAAAAAAGATTCAACACTGTATCTAGGTGAAACTCGTGTAGAACAAGAAGGAAAAAGTT  
 GGAAGAAGACGTATCTTTACAGCGATTAACTCGTATGGAAGTAAGGAAGAAAAAAGTCCGTGAAAGTGTGAGAAAT  
 CCGACAGACCGCATCGTCTTGGTTGGAACCAACAGTACTGCTCAAGAAAGTCAAAAAACCAAGTGTGAGAAAAA  
 GCAGATACAAAACCAATTGATTCAAGTGAAGTACTGCAAACTAATAAAGCCAGTTACCAAGTACAGGTAGTGGC  
 40 GCAAGCCAAGCAGCAGTAGCAGCAGGTTTAACTCTTCTAGGTTTGTAGTGACAGGATTAGTAGTTACTAAAGGTA  
 AAAGAAGACTAG

4101.5  
 ATGGATGCAATCTTTGACCTAATCGGAAAGGTTTTCAATCCCATCTTAGAAATGGGTGGACCTGTCTCATGTAA  
 45 TCATTTTGACAGTATTGGCTTACTTTTTGGAGTGAAATTTCTCCAAAGCGCTTGAAGGTGGTATCAAACTTGCCAT  
 CGCTCTTACAGGTATCGGTGCTATCATCGGTATGCTAAACACTGCTTCTCAGCATCACTAGCAAAATTCGTGAA  
 AACACTGGTATCCAATTGAGTATTACCGACGTTGGTTGGGCACCACTTGCTACAATCACTTGGGGTTCTGCTTGA  
 CACTATCTTCTTGTCTATCATGTTGATTGTCAACATAGTGATGCTAGCTATGAAGAAAAACAGATACACTTGAATG  
 50 CGATATCTTTGATATCTGGCACTTGTCTATCAGAGTCTCTTGATTAAATGGTATGCTGATAACAATGGTGTGAGT  
 CAAGGGGTTTCACTCTTTATTGCTACAGCAGCTATCGTCTTGTGCGGTGTGTTGAAAAATTAACAATCTGACTTGA  
 GAAACCTACATTTGATGACCTTCTTAACGCCCAAGTTATCACCATGACATCAACTCACATGAACTACATGATG  
 AACCCAGTTATCATGGTTTTGGATAAGATTTTGAAAAATTTCTCCAGGCTTGATAAATATGACTTTGATGCTG  
 55 CTAATTTGAACAAGAAAAATCGGTTTCTGGGGATCTAAATCTTTCATCGGTTTTCATCCTTGGTATCGTTATCGGTATT  
 ATGGGAACTCCACATCCAATTGCAAGGTGTTGCAGATGCAGATAAATGGCGTCTTGTATCAAAGGATGGTGTCTC  
 TTGGTTTGAAGTCCCGGTGTATCTTTGGAACCTCTTCACTTATCGGTTTATGTTTTCATCGCAGCCGTAGAACCCTA  
 TCACAAGGTATTAACAACGTTGCTACTAAACGCTCTCAAGGACGTAATTAATATCGGTCTTGAAGTCCCATTC  
 TCGTGGTGTGCTGAAATCTGGGCTTGTGCCAACGTAATTGCAACCAATCATGTTGATTGAAGCAGTGCTTCTTTC  
 AAAAGTTGAAAAATGGTATCTTGCCACTTGCAAGTATCATCGCTATGGGTGTTACTCCAGCTCTCTTGGTTGTA  
 60 CGTGGTAAATTTGCTCGTATGATTATCTTCGGAACACTCTTGTGCCACTCTTCTTCTTTCAGGTACACTTATTGC  
 ACCATTTGCAACAGAACTTGCTAAAGGTGTAGGTGCTTCCAGAAAGGTGTGAGCCAACTCAATTGATTACTCAC  
 TCTACTCTTGAAGGACCAATCGAAAACTTCTTGGTTGGACAAATGGTAACACTACAACCTGGTGATATCAAAGCA  
 TCTTGGTGAGTAGTCTTCTTGTATTCTATATCGGTATCTTGTGTTGATCAGAAAAACAATGATCAAAAGTAA  
 CGAAGAGTACGCAGCAAAAGCAAAATAA

65 4102.1

5 ATGAAGATTATGAAAAAAAAAATTGGACTTTAGCGATATTCTTTTGTGTTCAATAAATCTGTTACTGCTCA  
 AGAAATACCTAAAAATCTTGATGGCAATATACTCAGACTAGCGAAAGTTTTCTGAATCTGATGAAAA  
 ACAGGTTGACTATTCTAATAAAAAATCAAGAAGAGTAGACCAAAATAAATTTCTGATTCAAAATCGATAAGACAGA  
 ATTATTTGTAAACACAGATAAACATTTAGAAAAAACTGTTGTAATTTGGAACCTGAAACCACAAATAAATAACGA  
 TATTGTTAACTCTGAAAGTAATAATTTACTAGGCGAAGATAATTTAGATAATAAAATTAAGGAAAAATGTTTCTCAT  
 CTAGATAATAGAGGAGGAAATATAGAGCATGACAAAGATAAATAGAAATCGTCGATTGTAAGAAAAATGTAATGG  
 10 GATATAGATAAAGTTACTGGTGGAGGCGAAAGTTATAAATTATTTCTAAAAAGTAATTTCAAAAGTTCAATTTGCTA  
 TTTTAGATTTCAGGAGTCGATTTACAAAATCTGGATTACTGAAAAATCTTTCAATCACTCAAAAACTATGTCCC  
 CAATAAAGGATATTTAGGAAAAGAGGAGGAGGAGGAAGGAATAATATCAGATATTCAGATAGATTAGGTCATG  
 GTACGGCTGTTGTAGCTCAAAATTTAGGGGATGACAAATATTAATGGAGTAAATCCTCACGTTAATATTAACGTCTA  
 TAGAATATTTGGTAAGTCGTCTAGCTAGTCCAGATTGGATTGTAAAAGCAATTTTGTATGCTGTAGATGATGGCAAT  
 GATATTATCAATCTTAGTACTGGACAATATTTAATGATTGTAGGAGAATATGAGGACGGAACAAATGATTTTGAA  
 CATTTTTGAGACTTAATAAATTTATTAATGCAGAAAAATATAAAGAAGATTGGATTTTTTCGGCAACCATAGGAGG  
 15 ACTCCCTAAATGTATCAATCAGTCAGATTTATTGAAACTTTAGTTTCACGCAAAAAAGTAAGAAAAACCGGATT  
 AGTAGTTGATGTTCCAAAGTTATTTCTCATCTCAAAATTCGGTCCGAGGCATAGATCGCTTAG  
 GTAATTTATCAGATTTTAGCAATAAAGGGGATTCTGATGCAATATATGCGCCTGCGAGGCTCAACATTATCTCTTC  
 AGAATTAGGACTTAATAAATTTATTAATGCAGAAAAATATAAAGAAGATTGGATTTTTTCGGCAACCATAGGAGG  
 ATATACGTATCTTTATGAAAACCTATTTGCTGCTCTAAAGTTTCTGGTCCGATTGCAATGATTATTGATAAATACA  
 20 AATTAAAAAGATCAGCCCTATAATTATATGTTTGTAAAAAAATCTGGAAGAAACATTACCAAGTA  
  
 4106.1  
 25 ATGAAGAAAAACATGGAAGTGTTTTTAACGCTTGTAAACAGCTCTTGTAGCTGTTGTGCTGTGGCTGTGGTCAAG  
 GAATGCTTCTAAAGACAAAGAGGCGAGAACTTAAGAAGGTTGACTTTATCCTAGACTGGACACCAAAATACCA  
 ACCACACAGGCTTTATGTTGCCAAGGAAAAAGGTTATTTCAAAGAAGCTGGAGTGGATGTTGATTGAAATTTGC  
 CACCAGAAAGAAAGTTCTTCTGACTTGGTTATCAACGGAAAGGCACCATTTGCAGTGTATTTCCAAGACTACATGGC  
 TAAGAAATTGGAAGAGGAGCAGGAATCACTGCCGTTGCAGCTATTGTTGAACACAATACATCAGGAATCATCTC  
 TCGTAAATCTGATAATGTAAGCAGTCCAAAAGACTTGGTTGGTAAGAAATATGGGACATGGAATGACCCAACTGA  
 ACTTGCTATGTTGAAAACCTTGGTAGAATCTCAAGGTGGAGACTTTGAGAAGGTTGAAAAAGTACCAAAATACGA  
 30 CTCAAACTCAATCACACCGATTGCCAATGGCGTCTTTGATACTGCTTGGATTACTACGGTTGGGATGATCTCTT  
 GCTAAATCTCAAGGTGTAGATGCTAACTTCATGTAATGAAAGACTATGTCAAGGAGTTTGACTACTATTCACCAG  
 TTATCATCGCAAAACACGACTATCTGAAAGATAACAAAGAAGAGCTCGCAAGTCAATCAGGCCATCAAAAAAG  
 GCTACCAATATGCCATGGAACATCCAGAAGAAGTGCAGATATTTCTCATCAAGATGCACCTGAACCTCAAGGAAA  
 AACGTGACTTTGTATCGAATCTCAAAAAATCTGTCAAAAGAAATACGCAAGCGACAAGGAAAAATGGGGTCAAT  
 35 TTGACGCAGCTCGCTGGAATGCTTTCTCAAAATGGGATAAAGAAAAATGGTATCCTTAAAGAAGACTTGACAGACA  
 AAGGCTTACCAACGAATTTGTGAAATAA  
  
 4106.4  
 40 ATGATAAAAAATCCTAAATTTAATCAAGTCTTTTTAAGAAGTTTGTCAATTTAGGTGGTGTGGTCTAGTCA  
 TTCATATAGCTATTTATTTGACCTTCTTTTTATTATATTCAACTGGAGGGGAAAAAGTTTAATGAGAGCGCAAG  
 AGTGTTCACGGAGTATTTAAAGACTAAGACATCTGATGAAAATCCAAGCTTACTCCAGTCTTATTTCAAAGTCTTGT  
 ACCATATCTGCTCACCTTAAAAAGGATATTGTAGATAAGCGGCTCCCTCTTGTGATGACTGGATATTAAAGATG  
 GAAAGCTATCAAAATATATCGTGATGTTAGATATGTCTGTTAGTACAGCAGATGGTAAACAGGTAAACCGTGCAATT  
 TGTTCACGGGGTGGATGTCTCAAAAGAAGCAAGAATATTTTGTCTTTGTATCTCCCATATACATTTTGGTTACA  
 45 ATTGCTTTTTCTTCTTGTTTTTCTTATTTTATACTAAACGCTTGCTCAATCCTCTTTTTACATTTCAAGAGTGACT  
 AGTAAAAATGCAAGATTGGATGACAAATATTCGTTTTGTAGAAAGTAGGAAAGATGAAGTTGGTGAAGTTGGAAAAA  
 CAGATTAATGGTATGTATGAGCACTTGTGTAAGGTTATTTATGAGTTGGAAGTCGTAAATGAGCAAAATGTAATAA  
 TGCAAAATCAAAAGGTTTCTTTGTCCGGGAGCATCACATGAGTTGAAAAACCCCTTTAGCCAGTCTTAGAATTAT  
 CCTAGAGAATATGCAGCATAATATTGGAGATTACAAAGATCATCAAAATATATTGCAAGAGTATAAATAAGAT  
 50 TGACCAGATGAGCCACTTATTAGAAGAAGTACTGGAGTCTTCTAAATTTCAAGAGTGGACAGAGTGTCTGAGAC  
 CTTGACTGTTAAGCCAGTTTATGATAGATATTTATCACGTTATCAAGAATTAGCTCATTCAATAGGTGTTACAATTG  
 AAAATCAATTGACAGATGCTACCAGGGTCTGATGAGTCTTAGGGCATTGGATAAGGTTTGTACAAACCTGATTA  
 GTAATGCAATTAATAATTACAGATAAAAAATGGGCGTGAATCATATCCGAGCAAGATGGCTATCTCTATCAAAA  
 ATACATGTGCGCCTCTAAGTGACCAAGAACTAGAACATTTATTGATATATTCTATCATTCTCAAAATCGTGACAGA  
 55 TAAGGATGAAAGTTCGGGTTTGGGTCTTTACATTGTGAATAATATTTAGAAAGCTATCAATGGATTATAGTTTT  
 CTCCCTTATGAACACGGTATGGAATTTAAGATTAGCTTGTAG  
  
 4106.6  
 60 ATGTATTTAGGAGATTTGATGGAGAAAGCCGAGTGTGGTCAATTTTCAATACTTTCTTTCTATTACAAGAGTCTC  
 AGACGACCGTCAAGGCTGTAATGGAAGAAACAGGATTTTCAAAGCAACCCCTAACCAAAATATGTACCCCTGCTCA  
 ATGACAAGGCTTTGGATAGTGGCTTAGAGCTGGCTATTCAGTCAAGAGATGAAAATCTCGCTCTGTCTATCGGTGC  
 AGCTACCAAGGGGAGAGATATTCGAGCTTGTTTTTGGAGAGTGTCTTTAAATACCAGATTTTGGTTTATCTTCTC  
 TACCACCAACAGTTTTAGCCCATCAGCTGGCTCAAGAATTGGTGATTAGCGAGGCTACGTTGCTGCTGCTATGG  
 CTGTTTTAAATCAGATTTTGTGAGAAATTTGATTTATCCATCCAAAATGGCCGTTGGCGAGGTCCAGAGCATCAGAT  
 65 TCACTATTTCTATTTCTGTCTTTCCGAAAGGTCTGGTCCGAGTCAGGAATGGGAAGGTACATGCAAGAAACAGAG  
 AGAAAAACAGGAGATTGCCAATTTAGAGGAAATCTGCGGTGCAAGTTTGTCTGCGGGGACAGAAATGGCACTTGGTT

CTCTGGGCTCATCATGAGTCAACAACGCTCTCGGGTCAATGCTTGTGAGTTTCAAGTCATAGAAGAGAAAAATGGGA  
GGGTATTTTGACAAATATCTTTATCTTCGTTTGTCTGAGAAAGGTTCCGTCCTTTTGTCTGGGCAACATATCCACT  
AGGAGTTGAGGATGGTGAGATGATGATATTCTCTCTTTCTCCTATCTCATCGCAATCTTCTCTTCTACTATGG  
5 AGTATATTTCTGGTTTTGGAGGGCAGTTGGCAGATTTACTGACGCAATTGATTCAAGAAATGAAGAAGGAGGAAC  
TATTGGGGATTATACAGAGGACCATGTACCTATGAACCTCAGTCAGCTTTGTGCTCAAGTCTATCTCTATAAGGG  
CTATATTTTACAGGATCGTACAAGTACCAGTTAGAGAATCGTCATCCATATTTACTGATGGAACATGATTTTAAA  
GAGACAGCAGAGGAGATTTTTCATGCTCTACCTGCTTTTCAACAGGGGACAGATTTAGATAAGAAGATTCTCTGGG  
AATGGCTCCAGTTAATCGAATATATGGCTGAAAAACGGTGGCCAGCATATGGCGATTGGTCTGGATTGACATCTGG  
10 TTTCTTGTCTTTTCAAGGATGGCAGCCATTTTGAACCGGTATTTGGAATACAATCGTTTTATTACCATGAAGCTT  
ATGACCCTAGTCGGCATTATGATTTGCTGTTACCAATAACCCGATTCTAAGAAGGAACAGACACCAGTCTATTA  
TTAAAAAATGACTTGGATATGGAGGATTTGGTAGCGATTCCGCACTTATTATTCACTTA

4106.7

ATGGAATTTTCAAAGAAAACAGTGAATTGTCAATTAATAAATGCAGGAACGTACCCTGGACCTCTTGATTATC  
15 GGTGGAGGAATCACAGGAGCTGGTGTAGCCTTGCAGGGGAGCTAGCGGTCTTGAGACTGGTTTGATTGAAATG  
CAAGACTTTGACAGAAAGCAATCTAGTCGTTCAACAAAATTGGTTACGGAGGACTTCGTTACCTCAAACAATTTG  
ACGTAGAAGTGGTCTCAGATACGGTTTCTGAACGTGCAAGTGTTCACAAAATCGCTCCACACATTTCCAAAATCAG  
ATCCAATGCTCTTACCAGTTACGATGAAGATGGAGCAACCTTTAGCCTCTTCCGCTTTAAAGTAGCCATGGAGTT  
20 TACGACCTCTTGGCAGGTGTAGCAACACACAGCTCGGAACAAGGTTTTGAGCAAGGATCAAGTCTTGGAAACG  
CCAGCCAAACTTGAAGAAGGAAGGCTTGGTAGGAGGTGGAGTGATCTTGAAGTCCGTAACAACGATGCGCTCT  
CGTGATTGAAAACATCAACGCTGCCAACCAAGACGGTGGCCTCATTGCCAACCAAGGAGGAGGCTTCTCT  
CTTTGACGAAAGTGGCAAGATTACAGGTGTGTAGCTCGTGATCTCTTGAACAGCAAGTGTGAAATCAAGGCC  
CGTCTGGTTATTAATAACAACAGGTCTTGGAGTGATAAAGTACGTAATTTGTCTAATAAGGGAACGCAATTTCTCAC  
25 AATGCGCCCAACTAAGGGAGTTCACTTGGTAGTAGATTCAAGCAAAATCAAGGTTTACAGCCAGTTTACTTGG  
ACACAGGTTTGGGTGACGGTCTGATGGTCTTGTCTCCACGCTGAAAACAAGACTTACTTGGTACAACCTGATAC  
AGACTACACAGGTGATTGGAGCATCCAAAAGTAACCAAGAAGATGTAGATTATCTACTTGGCATTGTCAACAA  
CCGCTTCCCAAGATCCAACATCACCATTGATGATATCGAAAGCAGCTGGGCAAGTCTTGG  
TCCATTGATTGACAGGAACAGTGCCTCTGACTATAATGGTGGAAATAACGGTACCATCAGTGATGAAAGCTTTGA  
CAACTTGATTGCGACTGTTGAATCTTATCTCTCAAAGAAAAACAGTGAAGATGTTGAGTCTGCTGTGAGCAAG  
30 CTGAAAGTAGCACATCTGAGAAACATTTGGATCCATCTGCAAGTTCTCGTGGGTCTAGCTTGGACCGTAGCACA  
ATGGTCTCTTGAAGTCTTGGTGGTAAAATCACAGACTACCGTAAGATGGCTGAAGGAGCTATGGAGCGCGTGG  
TTGACATCTCAAAGCAGAAATTTGACCGTAGCTTTAAATTTGATCAATTTCAAACCTTACCCTGTTTCAAGTGGAGA  
ATTGAACCCAGCAAAATGTGATTGAGAAATCGAAGCTTTGCGCAACTTGAAGTATCAGTGGTTTGGATAGCA  
35 GGAAGCTCACTATCTGGCAAACTTTACGGTTCAAATGCAACCGAAAGTCTTGGCACTTGGCTCAGCTTGGAAACA  
GGCCAGGACTCAGCTTGGCAGATCTTTGTCCCTTCACTATGCAATGCGCAATGAGTTGACTCTTAGCCAGTTG  
ACTTCTTCTTCTGCTGATCAATCAATGCTCTTATGCGTGATAGCTTGGATAGTATCGTTGAGCCAAATTTGGAT  
GAAATGGGACGATTCTATGACTGGACAGAAAGAAAAAGCAACTTACCCTGCTGATGTGGAAGCAGCTCTCGCT  
AACAACGATTTAGCAGAAATAAAAAATTA

4106.8

ATGATGAATGAATTATTTGGAGAATTTCTAGGGACTTTAATCCTGATTCTTCTAGGAAATGGTGTGTTGACAGGTG  
TGGTTCTTCTTAAACCAAGAGCAATAGCTCAGGTTGGATTGTGATTACTATGGGTTGGGGGATTGCAAGTTGCGGT  
TGCACTCTTGTATCTGGCAAGCTCAGTCCAGCTTATTTAAACCCAGCTGTGACCATCGGTGTGGCCTTAAAGGT  
45 GGTGTGGCTTGGGCTTCCGTTTGGCTTATCTTAGCCAGTTTCGACGGGGCCATGCTGGGTGAGATTTTGGTTT  
GTTGCAATTCAAACCTCACTATGAGGCAGAGAAAATGCAGGCAATATCTGGCAACCTTCACTACTGGACCAAGC  
CATCAAGGATACTGTATCAAACTTGATTAGCGAAATCTTTGGAACCTTTGTTTTGGTGTGACAATCTTTGCTTTGG  
GTCTTTACGACTTTTCAAGCAGGTATCGGAACCTTTGCAAGTGGGAACCTTGATTGTGCGTATCGGTCTATCACTAGG  
TGGGACAACAGGTTATGCCCTTGAACCCAGCTCGTGACCTTGGACCTCGTATCATGCACAGCATCTTGGCAATTC  
50 AACAAGGGAGACGGAGACTGGTCTTACGCTTGGATTCTGTTGTAGGCCCTGTTATCGGAGCAGCCTTGGCAGTG  
CTTGTATTCTCACTTTCTAG

4106.10

ATGAAAAGGACCTGGAGGAACCTATTCGTGACAAATCTTAATACACCTTTTATGATTGGCAATATTGAGATTCCCA  
ATCGTACCGTTTTAGCGCTATGGCTGGCGTGACCAACTCAGCCTTTCTGACTATCGCAAAAGGAGCTCGGAGCTGG  
55 ACTCGTTGTATATGGAATGGTCTCTGACAAGGGAATCCAATACAACAACGAAAAAACCTGACATGCTTCATAT  
CGATGAGGGCGAAAAACCTGTCTTATCCAACCTTTTGGTAGCGATGAAGACAGCTAGCAGCGCAGCAGAAAT  
CATCCAAGAAAAACCAAGACCGATATCGTCGATATCAACATGGGCTGCCCTGTCAACAAAATCGTGAAGAACGA  
AGCTGGTGCTATGTGGCTCAAGGATCCAGACAAGATTACTCCATCATCAACAAGGTCCAGTCTGTCTTGTATC  
CCACTTACTGTCAAAATGCGTACCGGCTGGGCGGACCCATCTTGCAGTAGAAAAATGCTCTCGCTGCTGAAGCTG  
60 CAGGTGTTTCTGCCCTGCCATGCAATGGCCGTACCCGTGAACAAATGTATACTGGCCACGCAGACCTTGAGACCTT  
TTACAAGGTTGCCAAGCTTAACCAAGATTCCATTATCGCCAACGGTGATATCCGTAAGTCTCAAGAGCCAA  
GCAACGATCGAAGAAGTTGGTGCTGACGAGTCATGATTGGCCGAGCTGCCATGGGAAATCCTTACCTCTTCAA  
CCAAATCAACCATTAATTTGAAACAGGAGAAATCTACCTGATTGACCTTTGAAGACAAGATGAAGATCGCTA  
CGAACACTTGAAACGATTGATTAACCTCAAAGGAGAAAAACGTGCGAGTTTCTGGAATTCGCGGTCTCGCTCTCA

CTATCTCCGTGGAAACATCTGGCGCTGCCAACTCCGTGGAGCCATTTGCGAAGCCAGCACCTGGCAGAGATTGA  
AACCCTCTTGCAATTGGAGAAGGCTTAA

5

4107.1

10

ATGACAAAAGAAGAAAATTGAGCGTATTTCTGTAAACACCGAGAAAAGATTTTATGGCTCAAGTGGTATTTTCATGC  
GAGATAAAGAACCACTAAGTATAGTGTCTTGAGCGTAAAATGTTTATGCTGCTAAAAATCAAGATATGCTAG  
CTTATCAAAAATACGCAACTATCAAGCAGATAACAGATATTAGGGTACAAAAGTGAGGCTGACATTTTAGAGG  
CTGTAAAAGAGGTTTATGTGTACAATCACATGAATGTTATCGGAGCTTGTGAGCGGATATTATTTATCAGTCAATC  
ACCAGCTTATGATAAGTTAAATAAGTGGTTTAAATATCTATTCTGATTTGATTTTAGCGTTGTACCCCTTGCCCAAAA  
TGGGGGTATATCATGAGATGGTAGGTATCTAG

15

4107.2

20

25

30

35

40

45

50

55

60

ATGAAAAATCCAACGAGGCTGAGATGAAATTACTTTATACTGATATTCGGACTTCTTTGACAGAAATCTAACAA  
GAGAGGCAGAAGAGCTAGTTGCAGCTGGCAAGCGGGTCTTCTACATTGCCCCCACTCTCTTTCTTTGAAAAGGA  
ACGCGCGGTGCTGGAATACTTGTCCCAGCAGGCTTCTTTTCGATTACCGTCACGCGCTTTGCTCAAAATGGCTCGC  
TATCTGGTCTTGAATGATTACCAGCTAAAACACTCTTGTATGATATCGGTCTTGGGTGGCCCTTTTACAAATGCCT  
TGCCGAACCTCGATCCCAAGGACTTGCCTGTTTATGGCGCTATTAAGCAGGATCCTCAATTGATCCAGCAGTTAATT  
GAGCTTTACCATGAGATGACCAAAATCTCAGATGAGTTTTTGGACTTGGAGAATTTAAACAGATGAGGATAAGAGG  
GCGGATTTACTCTTGATTTTGGAGAAAGTAAACAGCCTATCTTAATCAAGGTCAGTTAGCCCAAGGAAAGTCAGTTGT  
CCCATTTGATTGAGGCTATTGAGAATGACAAGGTAAGTAGTGATTTTAATCAAAATCGCCTTGGTCAATTGACGGCT  
TACTCGTTTTTGTGGAGTCTTCTTATGACTTTTCAGAACTCGCTTGGATGTGATGAGAAAAGACCGTGAATAATTA  
TATGCTAGTAAGAAAGCCTATACCAGTCTTTTAGCGAGGGCAATCTCTACCAAGCCAGCGTAAAATTTCTCCATC  
ATCTGGCTTCTAAATACCAACGCGCTGCTCAGGACTGTTCTCAAACTCATGAGAAGATGGATAGTTTGGACAAGGC  
CTCTCGTTTTGTGGAGTCTTCTTATGACTTTTCAGAACTCGCTTGGATGTGATGAGAAAAGACCGTGAATAATTA  
CAAACTCGGTCTTGTGGTGGACGCAAAAGGAGGAGTTGGAGCTAGTAGCCCGTAGTATTCGTGCAAAAATACATGAG  
AACTCAGACCTGAGCTACAAGCATTTTCGTATTCTCTTGGGGATGTAGCTTCTTACCAGTTATCTCTCAAAACCA  
TTTTTGACCAGTATCAGATTCCTTTTATCTTGGTAGAAGCGAAGCCATGGCTCATCATCCCTTGACTCAGTTTGTG  
GAGTCTATTTTAGCTTTAAAACGTTACCGTTTTCGTCAGGAGGATTTGATTAATCTTCTTAGAACTGATTTGTATAC  
TGACCTCAGTCAGTCTGATATTGATGCTTTTGAGCAATATATCCGCTATCTTGGTATCAATGGCTTGCCAGCCTTTC  
AGCAAACTTCACCAAAATCCACCATGGAAAAATTAATCTTGAGCGTTTGAATGTCTCCGCTGAGAATTTTAGC  
ACCTCTTGAACCCCTCTTTGCCAGCGGAAAAACAAAAGGCTGAAAAACTCTACAAAAATGGAGTGTCTTTCTAAA  
AGAAGGAGCTGTGACCAAGCAGTTACAAGATTTGACAACCACTTTGGAAGCTGTAGAACAGGAAAGACAAGCCG  
AAGTTTGGAAAGGCTTCTGCCATGTTTTAGAACAATTTGCGACTGTTTTGTGCTGTTACAGGTTAGTCTGGAAGA  
CTTCTTAGCCTTGCTCCATTCTGGAATGAGTTTGTCCCAATACCGTACCATTCCAGCAACAGTGGACACTGTTCTG  
GTGCAGAGTTACGATTTGATTGACCACTTGAAGTGTGCTGCTGCTGCTATGCTATTGGACTAAGTCAAGGACAATTTAC  
CAAAAAATTTCTCAAAACACCAAGTCTTCTGACAGATGAAGAAAGGCAAAACCTAAACCAAGCGACCGAAGAAAGGC  
GTTCAATTAAGTATTGACAGCAGTGAATACTCAAGAAAAATCGCTACACTATGCTTTCTTGGTCAATTTCTGCTC  
GTAAGCAGTTGTTCTTGTGCGGCTCCAAGCCTTTTAAACGAAAGTGAAGTAAGGAATCTGCTATCTTCAAGAGTT  
GATCCATTTTGGATTTAGGCGGAGAGAGAAGAGGATGAATCACAAGGACTGTCTAAGGAGGATATGGGGTCTTA  
TCACAGTCTTTGTCTAGTCTGCTTGCCTATCACCAGCAGGGTGAGATGAGCGATACTGAGCAAGATTTGACTTTT  
GTCAAGGTTCTGTCGCTGTATAGGTAAGGTAAGTATGATCAGCAAGGTCTGGAATAATCCAGCTATCCCAACCACT  
CCAAGCAGCAAGACCTTAGCCAAGGACACCTTGCAAGCTCT  
CTATCTGCCAAACAGGAGTTTTACTGTCTACGTCGGGTTTGACAGAGTTTTATCGCAATGAATACAGTTATTTCT  
CTACGCTACGTTTTAGGCTTGACAGGAGGAATTACGTTTGCATCTGATGCCCGTAGTCACGGGAATTTCTTGCATC  
GTATCTTTGAACGCGCCTTACAGTTGCTAATGAAGATTCTTTGACCAACGCTAGAAACAAGCTATTCAAGAAAC  
CAGTCAAGAACGCGAATTTGAAGCTATTTATCAAGAAAGTTTGAAGCCCAAGTTTACCAAGGAAGTTTGTCTGAT  
GTTGCACGGACAACCTGGACATATTCTCCGACACAATCCAGCCATCGAAACCATCAAGAAGAAAGCAAAATTTGGT  
GGAAAAGACCAAGCCTTATTCAATTAGACAATGGACGCAAGTGTCTTTGTACGAGGCAAGGTGGACCGGATTGAC  
CGTTTGAAGCTAATGGAGCGATAGGAGTAGTAGACTACAAATCCAGTCTGACTCAGTTCCAGTTTCTCTATTCT  
TTAATGGGCTCAATTTCTCAGTTACCAACCTATCTTGTGCTTAAAAAGAGAAGGGGAGCAGAACTTTTTCGCGCGC  
CATGTACTTGGAAATGGCTGAACCTGTCCAATCTCTGATGGCGGTAAAAAGTCTGGCAGGAGCAGTGGTAGAAGC  
CAGCAAAATCTATGAAATACCAAGGGCTCTTCTTGGAAAAAGAAAGCAGTTATTTAGGCGAATTTTATAACAAAA  
CAAGGCTAATCAACTGACAGATGAGGAATTTAGCTCTTACTGGACTACAATGCCTATCTTTACAAGAAAGCTGCT  
GAGAAGATTTTAGCAGGCGGTTCCGCATCAATCTTATCTGAAAAATGGCAGAAGCATTGCCCATACGTCACG  
CAACATCAGGCTATTACAGGCTTTGAAGCCAATTACCATCTGGGCCAAGCCGTTTCTAGAAAAGTTGGACCTAG  
CTGATGGCAAGCGTCTGGTGGAGAAAAACTCAAGCAAGCTTGGCTTGAAAAAATAA  
GAGAGGAGTTGAATCGATGA

4107.3

65

ATGAAGCTTATTCCTTTTAAAGTGAAGGAGGAGATTCAAAAACTGCAAGAAGCAGAAGCAAAATTCGAGCAAGGAA  
CAGAAGAAAACTGCCGAGCAAAATCGAAGCTATCTACACTTCTGCCCAGAATATCCTGGTCTCAGCATCGGCTGGT  
TCTGGAAAGACCTTTGTCTGAGCAGGCGCATTTGACCAATTGGCGCTGGTGTGAAAAATTTCTCAACTCTTTA

TCTCAACCTTTACCGTCAAGGCTGCAACTGAACTTAAAGAACGTTTAGAGAAAAAATCAGCAAGAAAAATCCAAG  
AAACAGATGATGTCGACCTCAAAACAACCTTGGGTGCGCAGTTGGCAGACCTACCCAACGCTGCCATTGGAACCA  
TGGATTCTTTTCAACAAAAATTCCTTGGCAAAACATGGTTATCTGCTTGATATTGCACCTAATTTCCGTATTTTACAA  
5 AACCAAGCGAGCAACTTATTCTGAAAAACGAAGTCTTTCATGAGGTCTTTGAAGCGCATTACCAAGGTAAAAAG  
AAAGAGACCTTTAGTCATTTGCTGAAAAACTTTGCTGGGCGTGGCAAGGACGAAACGGGGTCTGCCAGCAGGTC  
TATAAAATCTATGACTTCTCCAATCCACAGTAATCTCAAAAGTGGCTGAGTGAATCTTTCTCAAGGATTTG  
AGAAAGCTGATTTTACCAGTGAAAAAGAAAAACTGACCGAGCAAAATCAAAACAAGCCCTTTGGGATTTGGAAGCT  
10 TTTTCCGTTACCATCTGGATAACGATGCCAAGGAGTTTGCAAAGGCTGCCATTATAGAAAAATGTCAGTTAATCT  
GGATGAAATTTGGCTCCCTAAATCAGGAGTCCGATAGTCAGGCTTATCAGGCAGTGCTTGGCGGTGTTGTCGCCATC  
TCTAAGGAGAAAAACGGTCGAGCTCTGACTAATGCCAGCGTAAGGCTGATTTGAAGCCCTGGCTGATGCCATC  
AACGAAGAGAGAAAGACCCAGTTTGTCTAACTAGGACAATTATCAGACCAGATAGCGAT  
TCTCGACTATCAAGAACGTTATCATGGAGACACTTGGAAAACTAGCTAAAACTTCCAATCTTTCATGAGCGATTTT  
GTAGAGGCTTATCGTCAGAGAAAAACGACAGGAAAAATGCCCTCGAATTCGCTGATATCAGCCATTACACCATTTGAG  
15 ATTTAGAGAAATTTCCACAAAGTTCGTGAGTCTTATCAGGAGCGCTTCCATGAAAGTCATGTCGATGAGTATCAGG  
ATACCAACCATATTCAAGAACGGATGCTGGAATTTGTTGTCTAATGGCCACAATCGCTTTATGGTGGGAGATATCAA  
GCAATCCATCTATCGTTTCCGTGAGGAGACCCGACAGATTTCAATGAGAAATTTCAACGCTATGCCAAAAATCCC  
CAAGAAGGCGAGGCTCATTATCTCAAGGAAAAATTTCCGTAGTAGTTTCAAGAGTGTCTGACGCAACCAATGATGTC  
TTTGAACGCTCTCATGGACCAAGAGGTGCGGCAATCAACTATGATAACAAAGCACCAGCTTGTTTTGGCAATACCA  
20 AACTGACTCCCAATCCAGACAACAAGGAGCATTCTCTCTACGACAAGGACGATACAGGTGAGGAAGAAAGAGA  
GTCAAAACAGAAACGAACTAACAGGCGAAATGCGCTTAGTTATCAAGGAGATTCTGAAACTTCATCAAGAAAAAG  
GTGTTGCCCTTTAAGGAAATTTGCCCTTCTGACCTCAGCCGACGTCGTAATGACCAGATTCTCCTGCCCTGTCTGA  
GTACGGAATTCCTGTCAAACTGACGGAGAGCAAAACAATTATCTCCAATCCCTAGAAAGTGAAGTCATGCTAGA  
CACTCTTCGTGTCATTCAAAATCCCTGCAAGACTACGCGCTTGGTTGCCCTTATGAAAGTCTCCAATGTTTGGTTTG  
ATGAGGATGAGCTAGCACGTTTGTCCCTTCAGAAAGCAGAGGATAAAGTCCACGAAAAATCTCTATGAGAACTGG  
25 TCAATGCACAAAAAATGGCAAGTAGTCAAAAGGCTTGATTACACAGCTCTAGCTG  
AAAACTAAAGCAATTCATGGATATCTAGCTTCTTGGCGCTTGTATGCCAAAACCACTCTCTCTATGACTTGAT  
TTGGAAGATTACAACGACCGTTTATTTATGACTATGTTGGGGCTTTGCCGAATGGTCTGCTAGGCAGGCCAAT  
CTCTATGCCCTAGCACTGCGTGTGATCAATTTGAAAAGAGCAATTTCAAAGGTTTGTCCGCTTTTATTCGTATGA  
30 TTGACCAAGTCTTAGAAGCCAGCACGATTTGGCAAGCGTGGCGCTGACCCGCAAAAGATGCAGTAGAGCTCA  
TGACCATCCACAAGAGTAAGGGCTGGAGTTTCTTACGCTTTTATCTCAATATGGATCAAGATTTCAACAAGCA  
AGACTCTATGTGCAAGAGTCAATCTCAGTGCAGAGGATGGTCTTGGGTCAATATATTGCCAAGATGGAGACAGGG  
GCAGTAGAAGACCACTATCTTAAAACCATCAAACTCTCCATTCTAGTCTGACCTATAGGCAGAACGAAGAGGAA  
TTACAGCTAGCAAGCTATTCTGAGCAGATGCGTTTGTCTGTATGTTGCTATGACGCGGGCTGAGAAAAAGCTCTATC  
35 TTGTCGGCAAGGGTTCTCGTGAAGGCTGGAATCCAAGGAATACCCAGCAGCCAAAAATGGGAACTAAATAGCA  
ATACTAGAGCTGCAAGCAGGAATTTCCAAGATTGGCTTTGGGCTATCAGTAAAGTGTCTTACTAAGGACAAGCTCA  
ACTTTAGTTATCGTTTATTGGCGAAGATCAGTTGACGAGAGAAGCTATCGGAGAGTTGGAACCAAGAGTCTCT  
CCAAGATAGCTCCCAAGCAGACAATCGTCAGTCAGATACCATCAAAAGAGCTCTGGAATGCTGAAGGAGGTGGA  
AGTTTATAATACTCTTCCCGCGCAGCTATTGAACCTCTTCTAGTGTTCAAACCCCAAGTCAAAATCAAGAAATTCAC  
40 GAACCAAGTTATGGATATGGAAGGTGTCGAGATTGCTGGTCAAGGTCAAGTCAAGTCAAGTCAAGTCAAGTCAAGT  
TTGCCAGATTTTCAACCAAGAAAAAGGTAACCTGGAGCTGAGATTGGTATGCTACTACGAACTCATGACAGAGA  
ATTGACCTCAGCCAGCAACTAACCCCTTGTAGCTTAAACAGAAACACTCAAAAGTTCAAACTAGCCAACTGCTG  
AGAGACAAGATCAATCTTGATAAAAAATTTCTGCTTTCTTGTGACACAGTACTCGGTCAAGGAAATCTGTAATACCG  
ACCATCTTTATCGCGAGCAACCTTTCTCATGCTCAACGAGACCAAAAGAGTCAGGAAGACTTTGTTGTCGGTGG  
45 TATCCTTGATGGCTATCTGCTTACGAAAAACAAATGTTCTGTTGCACTACAGACAGACCGCTATGATGAACCA  
AGTCAACTCGTAGACCGCTATCGTGGTCAGTTAGCTCTATACGAAGAGGCTTTATCAGGACCGCTATTCGATTGAAA  
ATATTGAAAAAATCTTGATTTTACTCGGTAAAGACGAGGTTCAAGTTGTAAGGTATAA

4109.1  
50 ATGGAACCTTGCTCGCCATGCTGAAAGCTTGGGAGTAGATGCTATTGCAACGATTCCACCAATTTATTTCCGCTTGC  
CAGAATACTCAGTTGCCAAATACTGGAACGATATCAGTTCTGCAGCTCCAAACACAGACTACGTGATTTACAACA  
TTCCTCAATTGGCAGGGGTTGCTTTGACTCCAAGCCTTTACACAGAAATGTTGAAAAAICCTCGTGTATCGGTGT  
GAAGAACTCTTCTATGCCAGTTCAAGATATCCAAACCTTTGTGACGCTTGGTGGAGAAAGCCATATCGTCTTTAAT  
GGTCTGATGAGCAGTTCTTAGGAGGACGCTCATGGGGCTAGGGCTGGTATCGGTGGTACTTATGGTCTATGCG  
55 CAGAACTCTTCTGAACTCAATCAGTTGATTGCGGATAAGGACCTAGAAACAGCGGTGAATTGCAGTATGCTAT  
CAACGCAATCATTGGTAACTCACTTCTGCTCATGGAATATGTACGGTGTCTCAAAAGAACTCTGAAAAATCAAT  
GAAGGCTTGAATATTGGATCTGTTCTGTTTACCATTGACACCAGTGACTGAAGAAGATCGTCCAGTTGTAGAAGCG  
GCTGCTGCCCTGATTCTGTAACCAAGGAGCGCTTCTCTAA

4110.2  
60 ATGTATAAGACAAAGTGTTTACGAGAGAAAGTTAGTATTATTTTTAAAAATTTCTTCCCAATCTGATCTACCAAT  
TTGCCAATTATCTGCCTCTTTTGTGATACTGCAATGACAGGTCAATACAACACTATGGACTTGGCTGGTGTATCT  
ATGGCAACCAAGTATCTGGAATCTTTCTTTACATTTCTAACAGGGATTGTGTGACGCTTGGTGTGATCAATGGTCA  
CCATCTTGGTCGAGGCAAAAGGAAGAGTTGCTGCTGATTTTACCAATTTATTTATTTGGCCTTGGGCTATCT  
65 GTGGTCTTGGTGGGATGCTATCTTTCTTGGCAACCAATAATCTTGAATCATATTGGGTTAGAAGCAGCAGTAGCGG  
CAGTAGCGGTTGCTATCTTTGGTTTTATCTATCGGATATCCCTTGTGCTCTTTAGCGTCAATCGTTCCTTGC



TGGATTGCTGGGCTTGACCAAACCTGTCCATGTACCTCATGCTTTTGTACTCCCTCTCAATAGCGGATTTAACTAT  
 CTCTTGATTACGGTGCCCTTTGGTGTCCAGAACTGGGAGGGGCTGGTGTGCTTTAGGAACATCCTTGGCCTACT  
 GGGTCTTGCTTGGGATTTCTGTTCTGGTTTTATTAAACAGGAGAAGCTCAAAGCCTTACACCTTGAGAAACGAAT  
 5 TCCACTTAATATGGATAAAATTAAGGAAGGAGTTCGTTTAGGTCTGCCTATTGGGGAACTGTCTTCGCGGAAGTG  
 GCTATCTTTTCAGTGGTTGGCTTGATTATGGCTAAGTTTTTCGCCCTTGATTATAGCTAGTCACCAGTCAGCTATGAA  
 CTTTCAAGTCTTATGTACGCCCTTCTATGAGTATCTCATCGGCTATGGCTATTGTGCTTTCTATGAAGTGGGAG  
 CCAAGCGATTTGATGATGCGAAAACCTATATTGGTCTAGGAAGATGGACTGCCCTCATTTTTGCGGCCCTTACCTT  
 AACCTTCCCTTACATTTTTAGGGGAAATGTGGCCAGTCTTATGGTAACGACCCAAAATTTATCGATTGACAGTG  
 10 CGTTTTTAACTTATAGTCTTTCTCCAGTTAGCAGATACCTTTCGGCGCCGCTTCAGGGAAATTTGCGGGGGTA  
 TAAGGATACAGTTATTCCTTTTACCTTGGTTTGTGGTTATTGGGGGTAGCAATCCCTGTGTACGCTATTGA

## 4112.2

ATGAGTACTTTAGCAAAAATAGAAGCGCTCTTGTGTAGCGGGTGAAGATGGGATTCGGGTCCGCCAGTTAGCT  
 GAACTCCTCTCTGCCACCGACAGGCATCCAGCAAAGTTTTAGGAAAATTAGCCAGAAATGAAAAAGGACCCA  
 15 GATTCCAGTTTGGCTTTGATTGAGACAAGTGGTCTTATAGATTGGTGACCAAGCCTCAATTTGCAGAGATTTGA  
 AGGAATACTCTAAGGCGCCTATCAACAGAGAGTGTCTCGGGCTGCCCTTGAGACCTTGTCCATTATTGCCTACAA  
 ACAGCCGATTAACGGATAGAAAATTGATGCTCCGTTGAGTTAACTCGAGTGGAGCCTTGGCAAAGTTGCAGGC  
 TTTTGACCTGATAAAGGAAGACGGGAAAAAGGAAGTATTGGGGCGCCCAACCTCTATGTGACTACGGATTATTT  
 20 CCTAGATTACATGGGGATAAACCAATTTAGAAGAATTACCAAGTATTGATGAGCTTGAGATTCAAGCCCAAGAAAG  
 CCAATTATTTGGTGAAGGATAGAAGAAGATGAGAATCAATAA

## 4113.1

ATGGATACGATGATTAGTAGATTTTTTCGCCATTTATTTGAAGCCTTAAAAAGTTTGAACGAAATGGTTGGATGA  
 25 CAGTAGCTGTCTCAGTTCAGTCAATGATTACTTTGACCTTGGTGGCAATATTTGCATCTGTTATTTTCAATACAGCG  
 AAACAGCTACAGATATTGAAAAATAATGTCGTGTAGTAGTTTATATCCGAAAGGATGTGGAAGATAATAGTCAG  
 ACAATTGAAAAAGAAGGTCAAACCTGTTACAAATAATGACTACCAAGGTATATGATTCTTTGAAGAACAATGTCT  
 ACGGTTAAAAAGTGTACCTTTTCAAGTAAAGAAGAACAAATATGAAAAATTAAACGAGATAATGGGAGATAACTGG  
 30 AAAATCTTTGAAGGAGATGCCAATCCTCTCTATGATGCTTATTTGTAGAGGCAAACTCCAAATGATGTAAGAA  
 ACTATAGCCGAAGATGCTAAAAAAATGAAGGTGTCTCTGAGGTTCAAGATGGCGGTGCCAATACAGAAAGACTC  
 TTCAAGTTAGCTTCATTTATCCGTGTTTGGGGACTAGGGATTGCTGCTTTGTTAATTTTTATCGCAGTTTTCTTGAT  
 TTCAAATACCAATTCGTATTACCAATTTATCCCGCAGTCGCGAAATTCAAATCATGCGCTTGGTCGGAGCTAAAAAC  
 AGTTATATCCGTGGACCGTTCTTGTAGAAGGAGCCTTTATCGGTTTATTGGGAGCTATCGCACCATTCTGTTTGGT  
 35 CTTTATTGTTTATCAAATGTTTACCAATCTGTCAACAAATCGTTGGTAGGGCAAAATCTATCCATGATTAGTCCA  
 GATTTATTTAGTCCGTGATGATTGCCCTACTATTGTGATTGGGGTTTTTCATTGGTTTCATTGGGATCAGGAATATC  
 CATGCCCGATTCTTGAAGATTTAG

## 4117.1

ATGAAAGAAAGTAAGATTTATTTTTTAGCTCTGCTATTTTCTTAGCTAGTCCAGAGGGTGCAATGGCTAGTGATG  
 40 GTACTTGGCAAGGAAAAACAGTATCTGAAAGAAGATGGCAGTCAAGCAGCAAAATGAGTGGGTTTTTGATACTCATT  
 ATCAATCTTGGTTCTATATAAAGCAGATGCTAACTATGCTGAAAAATGAATGGCTAAAGCAAGGTGACGACTATTT  
 TTACCTCAAAATCTGGTGGCTATATGGCCAAATCAGAATGGGTAGAAGACAAGGGAGCCTTTTATTATCTTGACCAA  
 GATGGAAAGATGAAAAGAAATGCTTGGGTAGGAACTTCTATGTTGGTGCAACAGGTGCCAAATGAATAGAAGAC  
 TGGGTCTATGATTCTCAATACGATGCTTGGTTTTATATCAAAGCAGATGGACAGCACGAGAGAAAGAAATGGCTC  
 45 CAAATTAAGGGAAGGACTATTATTTCAAATCCGGTGGTTATCTACTGACAAGTCAGTGGATTAAATCAAGCTTATG  
 TGAATGCTAGTGGTGCCAAAGTACAGCAAGGTTGGCTTTTTGACAAACAATACCAATCTTGGTTTTACATCAAAAGA  
 AAATGGAACTATGCTGATAAAGAATGGATTTTCGAGAATGGTCACTATTATTATCTAAAAATCCGGTGGCTACATG  
 GCAGCCAATGAATGGATTTGGGATAAGGAATCTTGGTTTTATCTCAAATTTGATGGGAAAAATGGCTGAAAAAGAA  
 TGGGTCTACGATTCTCATAGTCAAGCTTGGTACTACTTCAAATCCGGTGGTTACATGACAGCCAATGAATGGATTT  
 50 GGGATAAGGAATCTTGGTTTTATCTCAAATCTGATGGGAAAAATAGCTGAAAAAGAAATGGGTCTACGATTCTCATA  
 GTCAAGCTTGGTACTACTTCAAATCCGGTGGTTACATGACAGCCAATGAATGGATTTGGGATAAGGAATCTTGGTT  
 TTACCTCAAAATCTGATGGGAAAAATAGCTGAAAAAGAAATGGGTCTACGATTCTCATAGTCAAGCTTGGTACTACTTC  
 AAATCTGGTGGCTACATGGCGAAAAATGAGACAGTAGATGGTTATCAGCTTGGAAAGCGATGGTAAATGGCTTGA  
 55 GGAAAACTACAAATGAAATGCTGCTTACTATCAAGTAGTGCCTGTTACAGCCAATGTTTATGATTAGATGGTG  
 AAAAGCTTTCTATATATCGCAAGGTAGTGTGCTATGGCTAGATAAGGATAGAAAAAGTGATGACAAGCGCTTGG  
 CTATTACTATTTCTGGTTTGTGAGGCTATATGAAAACAGAAGATTACAAGCGCTAGATGCTAGTAAGGACTTTAT  
 CCCTTATTATGAGAGTGATGGCCACCGTTTTATCACTATGTGGCTCAGAAATGCTAGTATCCCAGTAGCTTCTCAT  
 CTTTCTGATATGGAAGTAGGCAAGAAATATTTCGGCAGATGGCCTGCATTTTGTGTTTTAAGCTTGAAGAATC  
 CCTTCTTTTCAAAGATTTAAACAGAGGCTACAACTACAGTGCTGAAGAATTGGATAAGGTATTTAGTTTGTCTAAA  
 60 CATTAACAATAGCCTTTTGGAGAACAAGGGCGCTACTTTAAGGAAGCCGAAGAACATTACCATATCAATGCTCTT  
 TATCTCCTTGCCCATAGTGCCCTAGAAAGTAAGTGGGGAAGAAATTTGCCAAAGATAAGAAATATTTCTTTG  
 GCATTACAGCCTATGATACGACCCCTTACCTTTCTGCTAAGACATTGTATGATGTGGATAAGGGAAATTTAGGTGC  
 AACCAAGTGGATTAAAGGAAATTTATATCGATAGGGGAAGAACTTCTTGGAAACAAGGCTTCTGGTATGAATGT  
 65 GGAATATGCTTCAGACCCCTATTGGGGCGAAAAAATTGCTAGTGTGATGATGAAAAATCAATGAGAAGCTAGGTGG  
 CAAAGATTAG



CTAGAGACAGATCCTTATATCACCTCAGGACGCCATCTGGTAGTACCCAAGGACGCGCCGAATCAAAAGGTGACA  
GCCAGTCTGCCAGTGGCGCATGAACTGGAGAGTTTGCAGAGAGATATCCTTCTTGACAGGCGGGTATGGATGTCTT  
GA

5

4122.1

10

15

ATGAAGAAAAGATACCTAGTCTTGACAGCTTTGCTAGCCTTGAGTCTAGCAGCTTGTTCAAGAAAAAACA  
AATGAAGATGGAGAACTAAGACAGAACAGACAGCCAAAGCTGATGGAACAGTCGGTAGTAAGTCTCAAGGAGC  
TGCCAGAGAAAAGCAGAAAGTGGTCAATAAAGGTGATTACTACAGCATTCAAGGGAAATACGATGAAATCATCGT  
AGCCAAACAACTATCCATTGTCTAAAGACTATAATCCAGGGGAAAATCCAACAGCCAAAGGCAGAGTTGGTCAA  
ACTCATCAAAGCGATGCAAGAGGCGAGTTTCCCTATTAGTGATCATTACAGTGGTTTTAGAAGTTATGAACTCAG  
ACCAAGCTCTATCAAGATTATGTCAACCAAGATGGAAGGCAGCAGCTGACCGTTACTCTGCCCGTCTGGCTAT  
AGCGAACACCAGACAGGCTTGGCCTTTGATGTGATTGGGACTGATGGTGATTTGGTGACAGAAAAAGCAGCC  
CAATGGCTCTGGATCATGCAGCTGATTATGGCTTTGTTGTCGGTTATCTCAAAGGCAAGGAAAAAGGAAACAGGCT  
ATATGGCTGAAGAATGGCACCTGCGTTATGTAGGAAAAAGCTAAAGAAATTGCTGCAAGTGGTCTCAGTTTGG  
AAGAATACTATGGCTTTGAAGGCGGAGACTACGTCGATTAA

20

25

30

35

4125.6

ATGCGTAAATTCCTAATTATTTGTTGCTACCAAGTTTTTTGACCAATTCAAAAGTCGTTAGCACAGAAAAAGAAG  
TCGCTATATCTTCGAAAGAAATTTATTACCTTTCACAATCTGACTTTGGTATTTATTTAGAGAAAAATTAAGTTCT  
CCCATGGTTTATGGAGAGGTTCTCTGTTTATGCGAATGAAGATTTAGTAGTGAATCTGGGAAATTGACTCCCAAAA  
CAAGTTTTCAAATAACCGAGTGGCGCTTAAATAAACAGGAATCCAGTATTTAAGCTATCAAATCATCAATTTAT  
AGCTGCGGACAAACGATTTTTATATGATCAATCAGAGGTAACCTCAACAATAAAAAAGTATGGTTAGAATCTGA  
TTTAAACTGTACAAATAGTCTTATGATTTAAAGAAAGTGAAATCATCTTATCAGCTTATTCCGAAGTATCAATC  
GACAAGACCATGTTTTAGAAAGGAAGAAATTTCTACATATTGATCAGGCTGGATGGGTAGCTAAAGAATCAACT  
TCTGAAGAAGATAATCGGATGAGTAAAGTTCAAGAAATGTTATCTGAAAAATATCAGAAAGATTCTTTCTCTATTT  
ATGTTAAGCAACTGACTACTGGAAAAGAGCTGGTATCAATCAAGATGAAAAGATGTATGCAGCCAGCGTTTTGA  
AACTCTCTTATCTCTATTATACGCAAGAAAAAATAAATGAGGGTCTTTATCAGTTAGATACGACTGTAAATACGT  
ATCTGCAGTCAATGATTTTCCAGGTTCTTATAAACAGAGGGAAGTGGTAGTCTTCTTAAAAAAGAGATAATAA  
AGAATATTTCTTAAAGGATTTAATTACGAAAGTATCAAAAGAAATCTGATAATGTAGCTCATAATCTATTGGGATAT  
TACATTTCAAACCAATCTGATGCCACATTCAAATCCAAGATGTCTGCCATTATGGGAGATGATTGGGATCCAAAAG  
AAAAATTGATTTCTTAAAGATGGCGGGAAGTTTATGGAAGCTATTTATAATCAAAATGGATTTGTGCTAGAGTC  
TTTGACTAAAAACAGATTTTGATAGTCAGCGAATTGCCAAAGGTGTTTCTGTTAAAGTAG  
CTCATAAAATTGGAGATGCGGATGAATTTAAGCATGATACGGGTGTTGTCTATGCAGATTCTCCATTTATCTTTCT  
ATTTTCACTAAGAAATCTGATTATGATACGATTCTAAGATAGCCAAGGATGTTTATGAGGTTCTAAAAATGA

40

45

50

55

60

65

4125.7

ATGAAAAAACAAAATAATGGTTTAAATAAAAATCCTTTTCTATGGTTATTATTTATCTTTTCTTGACAGGATT  
CCAGTATTTCTATTCTGGGAATAACTCAGGAGGAAGTCAGCAAATCAACTATACTGAGTTGGTACAAGAAATTAC  
CGATGGTAATGTAAAGAAATTAACCTACCAACCAATGGTAGTGTTATCGAAGTTTCTGGTGCTATAAAAAATCCT  
AAAAACAATAAGAAAGAAACAGGTATTCAAGTTTTTACGCCATCTGTTACTAAGGTAGAGAAATTTACCAGCACT  
ATTCTTCTGCAGATACTACCGTATCAGAATTGCAAAAACCTTGCTACTGACCATAAAGCAGAAAGTAAGTGTAAAGC  
ATGAAAGTTCAAGTGGTATATGGATTAATCTACTCGTATCCATTGTGCCATTTGGAATTTCTATTCTTCTCTATTCT  
TCTATGATGGGAAATATGGGAGGAGGCAATGGCCGTAATCCAATGAGTTTGGACGTAGTAAGGCTAAAGCAGCA  
AATAAAGAAAGATATTAAGTAAGATTTTCAGATGTTGCTGGAGCTGAGGAAGAAAAACAAGAACTAGTTGAAGTT  
GTTGAGTTCTTAAAGATCCAAAACGATTCAAAAACCTGGAGCCCGTATTCCAGCAGGTGTTCTTTGGAGGGAC  
CTCCGGGGACAGGTAAAACTTTGCTTGCTAAGGCAGTCCGCTGGAGAAAGCAGGTGTTCCATTCTTTAGTATCTCAGG  
TTCTGACTTTGTAGAAATGTTTGTGGAGTTGGAGCTAGTCGTGTTTCGCTCTCTTTTGGAGGATGCCAAAAAGCA  
GCACCAGCTATCATCTTTATCGATGAAATTGATGCTGTTGGACGTCAACGTGGAGTCCGCTCTCGGCGGAGGTAATG  
ACGAACGTGAACAAACCTTGAACCACTTTTGATTGAGATGGATGGTTTGGAGGAAATGAAGGGATTATCGTCA  
TCGCTGCGACAAACCGTTTCAGATGTACTTGACCCTGCTTTTGGCTCCAGGACGTTTTGATAGAAAAGTATTGGT  
TGGTCTGCTGATGTTAAAGGTCTGAAGCAATCTTGAAGTTCAAGCTAAGAAATAGC  
CTTTAGCAGAAGATGTTGATTGAAATTAAGTGGCTCAACAACTCCAGGCTTTGTTGGTGCTGATTAGAGAATGT  
CTTGAATGAAGCAGCTTTAGTTGCTGCTCGTCCGAATAAATCGATAATTGATGCTTCAGATATTGATGAAGCAGAA  
GATAGAGTTATTGCTGGACCTTCTAAGAAAGATAAGACAGTTTCAAAAAAGAACGAGAATTGGTTGCTTACCAT  
GAGGCAGGACATACCATTTGTTGGTCTAGTCTTGTGCAATGCTCGCGTTGTCCATAAGGTTACAATTGTACCAAGCG  
GCCGTGCAGGCGGATACATGATTGCACCTTCTAAAGAGGATCAAAATGCTTCTATCTAAAGAAAGATGAAAGAGC  
AATTGGCTGGCTTAATGGGTGGACGTGTAGCTGAAGAAATTAATCTTAAATGTCCAAACCAAGGAGCTTCAAAGC  
ACTTTGAACAAGCGACACAAATGGCACGTGCAATGGTTACAGAGTACGGTATGAGTGAAAAACTTGGCCAGTAC  
AATATGAAGGAAACCATGCTATGCTTGGTGACAGAGTCCCTCAAAATCAATTTGAGAACAACAGCTTATGAAA  
TTGATGAAGAGGTTCTGTTCAATTATTAATGAGGCAGGAAATAAGCTGCTGAAATTTTCAAGTCAATCTGTAAGC  
TCACAAGTTAATTGCAAGACGATTATTGAAATACGAAACATTGGATAGTACAAAAATTAAGCTCTTTACGAAAC  
AGGAAAGATGCCTGAAGCAGTGAAGAGGAATCTCATGCACTATCCTATGATGAAGTAAAGTCAAAAAATGAATGA  
CGAAAAATAA

4125.10

5 ATGAGGGAACCCAGATTTTTTAAATCATTTTCTCAAGAAGGGATATTTCAAAAAGCATGCTAAGGCGGTCTAGCTC  
TTTTCTGGTGGATTAGATTCCATGTTTTCTATTTAAGGTATTGTCTACTTATCAAAAAGAGTTAGAGATTGAATTGATT  
CTAGCTCATGTGAATCATAAGCAGAGAATTGAATCAGATTGGGAAGAAAAGGAATTAAGGAAGTTGGCTGCTGAA  
GCAGAGCTTCTATTTATATCAGCAATTTTTCAGGAGAATTTTCAGAAGCGCGTGCACGAAATTTTCGTTATGATT  
TTTTTCAAGAGGTCATGAAAAAGACAGGTGCGACAGCTTATGTCAGTCCCAACCATGCTGATGATCAGGTGGAAA  
CGATTTTTATGCGCTTGATTGAGGAACCTCGCTTGGCTATCTATCAGGAATTAAGGAGAAGCAAGTAGTCGGAGA  
10 GATAGAAATCAATTCGCTTCTTTCGCAATTTTCAGAAAAAGACTTCCATCAATTTTCACTTTGAAGATACATCA  
AATCAGGAGAATCATTATTTTCGAAATCGTATTCGAAATTTCTACTTACCAGAATTGGAAAAAGAAAATCCTCGAT  
TTAGGGATGCAATCTTAGGCATTGGCAATGAAATTTAGATTATGATTGGCAATAGCTGAATTATCTAACAAATAT  
TAATGTGGAAGATTACAGCAGTTATTTCTACTCTGAGTCTACACAAAGAGTTTACTTCAAACCTATCTGAATC  
GTTTTCCAGATTGAAATCTTACAAAAGCTCAGTTTGGTGAAGTTTCAGCAGATTTTAAAACTAAAAGCCAGTATCG  
15 TCATCCGATTAATAATGGCTATGAATTGATAAAAGAGTACCAACAGTTTCAGATTGTAAAAATCAGTCCGAGGCT  
GATGAAAAGGAAAGATGAACCTTGTGTACACTATCAAAATCAGGTAGCTTATCAAGGATATTTATTTCTTTTGGAC  
TTCCATTAGAAGGTGAATTAATTCACAAATACCTGTTTCAGGTGAAACATCCATACACATTCTGTCATCGAAAAAC  
AGGAGATGTTTTGATTAATAATGGGCATAGAAAAAACTCAGACGTTTATTTATTG  
AATTGCAACCAATAATTTGAGTAAAAAAACGAAAAATGATATAATGAACACTGTACTTTATATAGAAAAAATAGA  
20 TAGGTAA

4126.1

25 ATGTAAGCGTTCTTCTCTTTAGTTAGAATGGTTATTTCCATCTTTCTGGTCTTTCTCATTCTCCTAGCTCTGGTTGGA  
ACTTCTACTATCAATCAAGTTCTTCAGCCATTGAGGCCACCATTTGAGGGCAACAGCCAAACGACCATCAGCCAG  
ACTAGCCACTTTATTCAGTCTTATATCAAAAACTAGAAAACCACTCGACTGGTTTGACCCAGCAGACGGATGTTT  
TGCCCTATGCTGAGAATCCCACTCAAGACAAGGTGAGGGAATCCGAGATTTGTTTTGACCATTCTGAAGTCAGA  
TAAGGACTTGAAAACTGTTGTGCTGGTGACCAAACTCTGGTCAGGTCAATTTACAGATGACAGTGTGCAGATGAA  
AACTTCTCTGATATGATGGCTGAGGATTGGTACCAAAAGGCCATTTCATCAGGGAGCTATGCTGTTTTGACTCCA  
30 GCTCGTAAATCAGATAGTCACTGGGTCAATTTCTGTCACTCAAGAACTTGTGATGCAAAAGGGAGCCAATCTTGGTG  
TGCTTCGTTTGGATATTTCTTATGAACTCTGGAAGCCTATCTCAATCAACTCCAGTTGGGGCAGCAGGGCTTTGC  
CTTCATTATCAATGAAAACCATGAATTTGTCTACCATCTCAACACACAGTTTATAGTTCTGCTAGCAAAATGGAG  
GCTATGAAAACCTACATCGATACAGGTGAGGTTTACTCTGGTCAAAAATCCTACGTCAAGTCAAGAGAAGATT  
GCAGGAAGTATTGACGGTCTTGGCGTGTCTATTCGAAAAAGTTAGACCAGGTTCCGAGTCAGCTCTTGTGG  
ACCTTGGCTTGGGGCCAGTGTACATCTCTTCTGTCTGTCTGCTTGTGTTGAGTGTGGTTCACTTAAACGCTGGATTGC  
35 TCCTTTGAAGGATTTGAGAGAAACCATGTTGGAATTTGCTTCTGGTCTCAAAAATCTTCGTGCCAAGGAAGTTGGT  
GCCTATGAACTGAGAGAAGTAACTCGCCAATTTAATGCTATGTTGGATCAGATTGATCAGTTGATGGTAGCTATT  
GTAGCCAGGAAGAAACGACCCGTCAGTACCAACTTCAAGCCCTTTCGAGCCAGATTAAATCCACATTTCTCTATAA  
CACTTTGGACACCATCATCTGGATGGCTGAATTTTCATGATAGTCAGCGAGTGGTGACGGTGACCAAGTCTTTGGCA  
ACCTATGAAACCTTCCGCTTGGCGTCAATCAAGGCAAGGACTGATTTGTCTCTGACGAAATCAATCATGTCGCGCAGT  
40 ATCTCTTATCCAGAAACAAGCTATGGAGATAAGCTGGAATACGAAATTAATGAAAAATGTTGCCCTTGATAATTT  
AGTCTTACCCAAGCTGGTCTTACAAACCTTGTAGAAAAATGCTCTTACCATGGCATTAAAGGAAAAGGAAGGTCA  
GGGCCATATTAACTTTCTGTCCAGAAACAGGATTGGGATTTGGTCACTCGTATTGAGGATGATGGCGTTGGCTTC  
CAAGATGCTGGTGATAGTAGTCAAGTCAACTCAACGTTGGGGAGTTGGTCTTCAAAATGTGCGATCAACGGCTC  
AACTTTCATTTTGGAGCCAATTACCATATGAAGATTGATTCTAGACCCCAAAAAGGGACGAAAGTTGAAATATAT  
45 ATAAATAGAATAGAACTAGCTAA

4126.7

50 ATGAAGCGTTCTTCTCTTTAGTTAGAATGGTTATTTCCATCTTTCTGGTCTTTCTCATTCTCCTAGCTCTGGTTGGA  
ACTTCTACTATCAATCAAGTTCTTCAGCCATTGAGGCCACCATTTGAGGGCAACAGCCAAACGACCATCAGCCAG  
ACTAGCCACTTTATTCAGTCTTATATCAAAAACTAGAAAACCACTCGACTGGTTTGACCCAGCAGACGGATGTTT  
TGCCCTATGCTGAGAATCCCACTCAAGACAAGGTGAGGGAATCCGAGATTTGTTTTGACCATTCTGAAGTCAGA  
TAAGGACTTGAAAACTGTTGTGCTGGTGACCAAACTCTGGTCAGGTCAATTTACAGATGACAGTGTGCAGATGAA  
AACTTCTCTGATATGATGGCTGAGGATTGGTACCAAAAGGCCATTTCATCAGGGAGCTATGCTGTTTTGACTCCA  
55 GCTCGTAAATCAGATAGTCACTGGGTCAATTTCTGTCACTCAAGAACTTGTGATGCAAAAGGGAGCCAATCTTGGTG  
TGCTTCGTTTGGATATTTCTTATGAACTCTGGAAGCCTATCTCAATCAACTCCAGTTGGGGCAGCAGGGCTTTGC  
CTTCATTATCAATGAAAACCATGAATTTGTCTACCATCTCAACACACAGTTTATAGTTCTGCTAGCAAAATGGAG  
GCTATGAAAACCTACATCGATACAGGTGAGGTTTACTCTGGTCAAAAATCCTACGTCAAGTCAAGAGAAGATT  
GCAGGAAGTATTGGACGGTGTCTGGCGTGTCACTATTGGAAAAAGTTAGACCAGGTTCCGAGTCAGCTCTTGTGG  
60 ACCTTGGCTTGGGGCCAGTGTACATCTCTTCTGTCTGTCTGCTTGTGTTGAGTGTGGTTCACTTAAACGCTGGATTGC  
TCCTTTGAAGGATTTGAGAGAAACCATGTTGGAATTTGCTTCTGGTGTCTCAAAAATCTTCGTGCCAAGGAAGTTGGT  
GCCTATGAACTGAGAGAAGTAACTCGCCAATTTAATGCTATGTTGGATCAGATTGATCAGTTGATGGTAGCTATT  
GTAGCCAGGAAGAAACGACCGTCAATACCAACTTCAAGCCCTTTCGAGCCAGATTAAATCCACATTTCTCTATAA  
CACTTTGGACACCATCATCTGGATGGCTGAATTTTCATGATAGTCAGCGAGTGGTGACGGTGACCAAGTCTTGGCA  
65 ACCTATTTCCGCTTGGCGCTCAATCAAGGCAAGGACTTGATTGTCTCTCTGACGAAATCAATCATGTCCGCCAGT  
ATCTCTTATCCAGAAACAAGCTATGGAGATAAGCTGGAATACGAAATTAATGAAAAATGTTGCCCTTGGATAATTT

5 AGTCTTACCCAAGCTGGTCTACAACCCCTTGTAGAAAAATGCTCTTACCATGGCATTAAAGGAAAAAGGAAGGTCA  
GGGCCATATTAACCTTTCTGTCCAGAAACAGGATTCGGGATTGGTCATCCGTATTGAGGATGATGGCGTTGGCTTC  
CAAGATGCTGGTGATAGTAGTCAAAGTCAAACTCAAACGCTGGGGGAGTTGGTCTTCAAATGTGCGATCAACGGCTC  
AACTTCATTTTGGAGCCAATTACCATATGAAGATTGATTCTAGACCCCAAAAAGGGACGAAAGTTGAAATATAT  
ATAAATAGAATAGAACTAGCTAA

4127.4  
10 ATGTTTTTAAATTATTAAGAGAAGCTCTTAAAGTCAAGCAGGTCGATCAAAAAATTTTATTTACAATTTTATCGT  
TTTGGTCTTTCGTATCGGAACCTAGCATTACAGTTCCTGGTGTGAATGCCAATAGCTTGAATGCTTTAAGTGGATTAT  
CCTTCTTAAACATGTTGAGCTTGGTGTGGGGAATGCCCTAAAAAACTTTTCGATTTTGGCCCTAGGAGTTAGTCC  
CTATATCACCGCTTCTATTGTTGTCCAACCTCTTGCAAATGGATATTTTACCCAAGTTTGTAGAGTGGGGTAAACAA  
GGGGAAGTAGGTGCGAAGAAAAATTGAATCAAGCTACTCGTTATATTGCTCTAGTCTCGCTTTTGTGCAATCTATCG  
GGATTACAGTGGTTTTTAATACCTTGGCTGGAGCTCAATTGATTAAAACTGCTTTAACTCCACAAGTTTTCTGAC  
15 GATTGGTATCATCTTAACAGCTGGTAGTATGATTGTCACTTGGTTGGGTGAGCAAAATACAGATAAGGGATACGGA  
AACGGTGTITCCATGATTATCTTGTCCGGGATTGTTTCTCAATTCAGAGATGATTAGGGCATCTATGTGGACT  
ACTTTGTGAACGTCCCAAGTAGCCGTATCACTTCATCTATCATTTTTCGTAATCATTTTGATTATTACTGTATTGTTG  
ATTATTTACCTTTACAACCTTATGTTTCAACAAGCAGAATACAAAAATCCAAATCCAAATATACTAAGGTTGCAAGGTG  
CTCCATCTAGCTCTTACCTCCGTAAAAAGTAAACCTGCTGGAGTTATCCCTGTTATCTTTGCCAGTTCGATTACT  
20 GCAGCGCTGGGGCTATTCTTCAGTTTTTGTAGTGCCACAGGTCATGATTGGGCTTGGGTAAAGGGTAGCACAAGAGA  
TTGTGGCAACTACTTCTCCAAGTGGATTGCCATGTATGGCTTGTGATTATTCTCTTACATTCTTCTATACGTTTG  
TACAGATTAATCTGAAAAAGCAGCAGAGACCTACAAAAAGAGTGGTGCCTATATCCATGGAGTTTCGTCTGGTAA  
AGGTACAGAAGAATATATGTCTAACTTCTTCGTCTTGCAACTGTTGGTTCCTCTTCTTGGTGTGA

25 4127.5  
ATGGATATTAGACAAGTTACTGAAACCATCGCCATGATTGAGGAGCAAACTTCGATATTAGAACCATTACCATG  
GGGATTTCTCTTTGGACTGTATCGATCCAGATATCAATCGTCTGCGGAGAAAAATCTATCAAAAAATTACGACAA  
AGGCGGCTAATTTAGTAGCTGTTGGTGTGAATTTGCGGCTGAGTTGGGAATTCCTATCGTTAATAAGCGTGTATC  
30 GGTGACACCTATTTCTCTGATTGGGGCAGCGACAGATGCGACGGACTACGTGGTTCTGGCAAAAGCGCTTGATAA  
GGCTCGGAAAGAGATTGGTGTGGACTTTATTGGTGGTTTTCTGCTTAGTACAAAAAGGTTATCAAAAAAGGAGAT  
GAGATTCTCATCAATTCCATTCTCGCGCTTTGGCTGAGACGGATAAGGTCTGCTCGTCAGTCAATATCGGCTCAA  
CCAAGTCTGGTATTAATATGACGGCTGTGGCAGATATGGGACGAATTATCAAGGAAACAGCAATCTTTCAGATA  
TGGGAGTGGCAAGTTGGTTGTAATCGCTAATGCTGTTGAGGACAATCCATTATGGCGGGTGCCTTTCATGGTGT  
35 TGGGAAGCAGATGTTATCATCAATGTCGGAGTTCTGGTCTGGTGTGTGAAACGTGCTTTGGAAGGTTTCCT  
GGACAGAGCTTTGATGTAGTAGCCGAAACAGTTAAGAAAACTGCCTTTAAATCACTCGTATCGGTCAATTTGGTTG  
GTCAAAATGGCCAGTGAGAGACTGGGTGTGGAGTTTGGTATTGTGGACTTGAGTTTGGCACCAACCCCTGCGGTGG  
AGACTCTGTGGCACGTGTCTTGGAGGAAATGGGGCTAGAAACAGTTGGCACGCATGGAAACGACGGCTGCCTTGGC  
40 CCTCTTGAAGCAGCAAGTTAAAAAGGGTGGAGTGTGGCCTGCAACCAAGTCGGTGGTTTATCTGGTGCCTTTATC  
CCTGTTTCTGAGGATGAAGGAATGATTGTGTCAGTGCAAAATGGCTCTCTTAATTTAGAAAAACTAGAAGCTATGA  
CGGCTATCTGTTCTGTTGGATTGGATATGATTGCCATCCCAGAGATACGCCTGCTGAAACTATTGGCGCTATGAT  
TGCGGATGAAGCAGCAATCGGTGTTATCAACATGAAAAACAACAGCTGTTCTGATCATCTCCAAAGGAAAAAGG  
CGATATGATTGAGTTTGGTGGTCTATTAGAACTGCACCGTTATGAAGGTTAATGGGGCTTCGTCTGTCGACTTC  
ATCTCTCGCGGTGGACAAATCCCAGCACCAATCATAGTTTTAAAAATTAA

45 4128.1  
ATGACACAGATTATTGATGGGAAAGCTTTAGCGGCCAAATTGCAGGGGCAGTTGGCTGAAAAGACTGCAAAATTA  
AAGGAAGAAACAGGTCTAGTGCTGGTTTGGTAGTGAATTTGGTTGGGGACAATCCAGCCAGCCAAGTCTACGTT  
CGCAACAAAGGAGAGGTACAGCCCTTGGGCTGGTTTCCGTAGCGAAGTAGTACGGGTTCCAGAGACCAATTACTCAA  
50 GAGGAATTTGTAGACCTGATTGCTAAATACAATCAGGATCCAGCTTGGCATGGGATTTTGGTTCAAGTTGCCATTAC  
CAAAACACATTGATGAAGAGCGGTTCTATTGGCTATTGACCCAGAAAAAGGATGTGGATGGTTTCCATCTCTAA  
ACATGGGGCGTCTTTGGTCTGGTCAATCCAGTCATGATTCTTTCGACACCGGCAGGAATTATGGAATGTTCCATGA  
ATATGGGATTGACTTGGAAAGTTAAAAATGCAGTCGTATCGGTGATCCAAATTTGTGCGGAAAACTATGGCCCA  
GCTTCTTTTGGCAAGAAATGCAACAGTAACCTTGACTCACTACGTACTCATAATCTTCCAAAGGTGGCTGCAAAA  
55 GCAGATATTCTGGTTGTGCAATCGGTGCTGCAAGTTTGTGACTGCTGACTTTGTCAAAACAGGTGGGTAGTCA  
TTGACGTTGGGATGAACCGGATGAAAAATGGTAAGCTCTGTGGGATGTTGATTATGAGGCGTTGCCCACTTGC  
TAGCCACATTACGCCAGTCCCTGGAGGTGTCGGTCTATGACCATTACTATGCTGATGGAGCAAACTATCAGGCA  
GCACTTAGGACATTGGATAGAAAATAA

60 4128.2  
ATGCTAAAATTAATCGTATTCAATTTGGTGGTACTGGATTCTGTAGGAATCGGTGCAGCACCAGATGCTAATAACT  
TTGTCATAGCAGGGTTCCAGATGGAGCTTCTGACACACTGGGACACATTTCAAAAAAGTTGGTTGAATGTCC  
AAACATGGCTAAAATAGGCTTGGAAATATTCTCGTGAAACTCTCTTAAGACTGTAGCAGCTGAAAGCAATCC  
65 AACTGGATATGCAACAAATTAAGAGGAAGTATCTTGGTAAGGATACTATGACTGGACACTGGGAAATCATGGG  
ACTCAACATTACTGAGCCTTTTCGATACCTTTCTGGAACGGATTCCAGAGAAATCCTGACAAAAATCGAAGAAATTC  
TCAGGACGCAAGGTTATTCTGTAAGCCAAACAACTTATTCAGGAACGGCTGTTATCTATGATTTTGGACCACGTC

5 AGATGGAACTGGAGAGTTGATTATCTATACTTCAGCTGACCCTGTTTTGCAGATTGCTGCCCACGAAGACATTAT  
TCCTTTGGATGAATTTGTACCGTATCTGTGAATACGCTCGTTTCGATTACCCCTTGAGCGTCCTGCCCTTCTGGTCGCA  
TCATTGCTCGCCCTTATGTAGGTGAACCAAGTAACTTCACTCGTACGGCAAACCGTCGTGACTTGGCTGTATCTCC  
ATTTTTCCCAACTGTTTTGGATAAAATGAATGAGGCTGGTATCGATACTTATGCTGTGGGTAATAACGATATC  
10 TTTAACGGTGCTGGTATCAACCATGACATGGGTCAACAAGTCAAATAGTCATGGAATTGATACACTATTGAAG  
ACTATGGGACTTGTGAGTTTGAAGGAGTTCTCATTCAAAACCTAGTTGACTTTGATGCCCTTTACGGCCATC  
GTGCTAATGCTCACGGTTACCGTGATTGGCTTGCATGAGTTTGATGAACGCTTACCTGAAATTATCGCAGCTATGAG  
AGAGATGACCTTCTCTGATTACTGCGGACCATGGAATGACCCAACGTATGCAGGAACGGATCACACTCGGGA  
ATATATTCCATTGTTGGCTATAGCCCTGCCCTTAAAGGAAATGGTCTCATTCCAGTAGGACATTTTCAGATATTT  
CAGCGACTGTTGCCGATAACTTTGGTGTGAAACTGCTATGATTGGGAAAGTTTCTTAGATAAATTTGGTATAA

4129.2  
15 ATGTTTATTTCCATCAGTGCTGGAATTGTGACATTTTTACTAACTTAGTAGAAATTCGGGCCCTTATCCAAATTTA  
TAGAAAGGCCCAAATTACAGGCCAGCAGATGTCATGAGGATGTCAAACAGCATCAGGCAAAGCTGGGACTCTA  
CAATGGGAGGTTTGGTTTTCTTGATTACTTCTGTTTTGGTTGCTTTCTTTTCGCCCTATTTAGTAGCCAATTCAGCA  
ATAATGTGGGAATGATTTTGTTCATCTTGGTCTTGTATGGCTTGGTCGGATTTTATAGATGACTTTCTCAAGGTCTTT  
CGTAAATCAATGAGGGCTTAATCCTAAGCAAAATAGCTCTTCAGCTTCTAGGTGGAGTTATCTTCTATCTTT  
20 TCTATGAGCGCGGTGGCGATATCCTGTCTGTCTTTGGTTATCCAGTTCAATTTGGGATTTTTCTATATTTCTTCGCT  
CTTTTCTGGCTAGTCTGTTTTTCAAACGCAAGTAACTTGACAGACGGTGTGACGGTTTAGCTAGTATTTCCGTTGT  
GATTAGTTTGTCTGCCATGAGGATTATGCTATGTGCAAGGTGAGATGATTTCTTCTAGTGATTTGCGCATGA  
TTGGTGGTTTGGCTCGGTTTTCTCATCTTTAACCAATAAGCTTGCCTGCAAGGTCTTATGGGTGATGTGGGAAGTTGGCC  
CTAGGTGGGATGCTGGCAGCTATCTCTATGGCTCTCCACCAAGAATGGACTCTCTTGATTATCGGAATTTGTGTATG  
TTTTGAAACAACTTCTGTTATGATGCAAGTCAGTTATTTCAAACGACAGGTGGTAAACGATTTTCCGATGAC  
25 GCTGTACATCACCATTGTGAGCTTGGGGATTTGCTGTAAGGAAATCCTTGGAGCGAGTGGGAAGTTGACTTC  
TTCTTTTGGGAGTGGGACTTCTAGCAAGTCTCTGACCCTAGCAATTTTATATTGATGTAA

4133.1  
30 TTGTTTAAAGAAAAATAAGACATTTCTTAATTTGCAATTGCCAGCTATGGGTGAAAACTTTTTGCAGATGCTAATGG  
GAATGGTGGACAGTTATTTGGTTGCTCATTTAGGATTGATAGCTATTTCAAGGGTTTCAGTAGCTGGTAATATTAT  
CACCATTATCAGGCGATTTTCATCGCTCTGGGAGTGCTATTTCCAGTGTTATTTCAAAGCATAGGGCAGAAA  
GACCAGTCGAAGTTGGCTATCATGTGACTGAGCGGTGAAGATTACCTTACTATTAAGTTTCTTTTAGGATTTT  
GTCCATCTTCTGGTGGGAAAGAGATGATAGGACTTTTGGGACGGAGAGGGATGTAGCTGAGAGTGGTGGACTGTA  
TCTATCTTTGGTAGGCGGATCGATTGTTCTCTAGGTTAATGACTAGTCTAGGAGCCTTGATTCGTGCAACGCAT  
35 AATCCACGTCTGCCCTCTATGTTAGTTTTTATCCAATGCCCTGAATATTCTTTTTCAAGTCTAGCTATTTTTGTT  
CTGGATATGGGATAGCTGGTGTGCTTGGGGGCAATTGTGCTCGTTGGTTGGTCTTGTGATTTTGTGTCAC  
AATTAAGTGCCTTATGGGAAGCCAACCTTTGGTTAGATAAGGAACTGTTGACCTTGGCTTTACCAGCAGCTGG  
AGAGCGACTTATGATGAGGGCTGGAGATGTAGTGATTCGCTTGGTCTTTCTTTTGGGACGGAGGCAATGTGCT  
GGGAATGCAATCGAGAAGTCTTGACCCAGTTTAACTATGCTGCTGCTTGGCGTCTGACGGCAACGGTCTGCG  
40 TGTGGCCCCAGCAGTTGGAGAGGATGATTGGAAGAGTTGCTAGTTGAGTAAACAAACCTTTTGGCTTTCTCT  
GTTCTCATGTTGCCCTCTGCTTTAGTATATATGCTTGGGTGTACCTTAACCTCATCTCTATACGACTGATTCCT  
TAGCGGTGGAGGCTAGTGTCTAGTGACACTGTTTCACTACTTGGGACCCCTATGACGACAGGAACAGTCATCTA  
TACGGCACTCTGGCAGGGATTAGGAAATGCACGCTCCCTTTTATGCGACAAGTATAGGAATGTGGTGTATCCGC  
ATTGGGACAGGATATCTGATGGGATTTGCTTGGTGGGCTTGCCTGGTATTTGGGCAGGGTCTCTCTTGATA  
45 ATGTTTTCTGCTGTTATTTCTACGCTATCGTTACCAGCGCTATATGAGCTTGAAGGATAG

4135.2  
50 ATGCAAACTCAAGAAAAACACTCGCAAGCAGCCGTTCTTGGCTTGCAGCACTTACTAGCCATGTACTCAGGATCT  
ATCCTGGTTCCCATCATGATTGCGACAGCCCTTGGCTATTCAGCTGAGCAGTTGACCTACCTGATTTCTACAGATA  
TCTTCATGTGTGGGGTGGCAACCTTCTCCAACCTCAACTCAACAAATACTTTGGGATTGGACTCCAGTCGTTCT  
TGGAGTTGCATTCCAGTCGGTCTGCTCCCTTGATTGATTGGGCAAGCCATGGTAGTGGCGCTATGTTTGGTGCC  
CTTATCGCATCTGGGATTTACGTGGTCTTGTTCAGGCATCTTCTCAAAGTAGCCAATCTCTTCCCATCTATCGT  
55 AACAGGATCTGTTATTACCACGATTGGTTTAACTTGTATCCCTGCTGCTATTGGAAATATGGGAAATAACGTTCCA  
GAGCCAACTGGTCAAAGTCTCTTGTGCTGAGCTATTACTGTTCTGATTATCCTCTTGATCAACATCTTTACCAAAG  
GATTTATCAAGTCTATCTCTATTTTGAATGGTCTGGTTGTTGGAACCTGCAATGCTGCTACTATGGGCTTGGTGGAC  
TTCTCTCTGTTGGGTAGCTCCACTGTCCATGTCCAACTCACTCTACTTTGGGATGCCAACCTTTGAAATCTC  
ATCTATTGTCATGATGTGTATCATCGCAACGGTGTCTATGGTTGAGTCAACTGGTGTATCTGGCTTGTGATA  
TCACAAAGGATCCAATCGACAGCAGCGCTTCCGAACGGATACCGCGCAGAAGGTTTGGCGTACTTCTCGGAG  
60 GAATCTTTAACACCTTCCCTTACACCGGATTTTCAAAAAAGCTGGTTTGGTTAAATTTGTCAGGCATCAAAAAAGC  
CCTGCCAATCTACTACGACAGCTGGTTTCTGGTTCTCTTGGACTGCTTCTAAGTTTGGCGCCCTTGCCTCAATCA  
TTCCAAGCTCCGTCCTGGTGGTGGCATGCTGGTAATGTTTGGTTTGTATCAATTCAAGGGATGCAAACTCTCGC  
CCGTGTTGACTTTGCTAACATGAACACAACCTTCTTATCGCAGCTGTTTCAATCGCTGACGGTGTGGTCTCAAC  
AACAGTAATCTCTTTGTGAGCATGCCGACAGCTTCCAAATGTTCTTCTCAAACGGAATCGCTGATGCCAGCCTAC  
TCGCTATTGCTCAATGCCGTATTAATCATAAAAAGAAATAA

65 4136.2

ATGAAAGATAGAATAAAAGAATATTTACAAGACAAGGGAAGGTGACTGTTAATGATTTGGCTCAGGCTTTGGGA  
 AAAGACAGTTTCCAAGGATTTTCGTGAGTTGATTAAACCTTGTCTTAATGGAAAGAAAGCACCAAATTCGTTTTG  
 AAGAAGATGGTAGTCTGACATTAGAAATTAAGAAAAACATGAGATTACCTCAAGGGGATTTTCATGCCCAT  
 AAAATGGCTTTGGCTTTGTTAGTCTGGAAGGCGAGGAGGACGACCTTTTGTAGGGAAAAATGATGTCAACTATGC  
 5 TATTGATGGTGATACCGTCGAGGTAGTGATTAAGAAAGTCGCTGACCGCAATAAGGGAACAGCAGCAGAAGCCAA  
 AATTATTGATATCTAGAACACAGTTTGACAACAGTTGTGCGGCAAAATCGTTCTGGATCAGGAAAAACCTAAGTAT  
 GCTGGCTATATTCGTTCAAAAAATCAGAAAAATCAGTCAACCGATTTATGTTAAGAAACAGCCCTAAAAATTAGAA  
 GGAACAGAAGTTCTCAAAGTCTTTATCGATAAATACCAAGCAAGAAACATGATTTCTTGTGCGGAGTGTCTCG  
 10 ATGTAGTGGGACACTCAACGGATGTCGGAATTGATGTTCTTGAGGTCTTGGAAATCAATGGACATTGTATCCGAGTT  
 TCCAGAAGCTGTTGTTAAGGAAGCAGAAAGTGTGCTGATGCTCCGCTCTCAAAAGGATATGGAAGGTCTGCTGGA  
 TCTAAGAGATGAAATTACCTTTACCATTGACGGTGGGATGCCAAGGACTTGGACGATGAGTGCATATCAAGGC  
 TCTGAAAAATGGCAATCTGGAGTTTGGGGTTCACATCGCAGATGTTTCTTATTATGTGACCGAGGGGTCTGCCCTT  
 GACAAGGAAGCCCTTAACCGTGGCACTTCTGTTTACGTGACAGACCGAGTGGTGCCAACTCTCCAGAAGCACTA  
 15 TCAATGGCATCTGCTCTCTCAATCCCAAGTTGACCGCTGACCCAGTCTGCTATTAT  
 GGAGATTGATAAATCATGGTCTGTTGGTCAACTATACCATACACAAACAGTTATCAAGACCAGTTTTCGTATGACC  
 TATAGCGATGTCAATGATATCTAGCTGGCGATGAAGAAAAAGAAAAAGAAATATCAAAAAATGTATCAAGTATC  
 GAACTCATGGCCAAGCTTCATGAACTTTAGAAAAATGCGTGTGAAACGTGGAGCTCTCAATTTTGTATACCAATG  
 AAGCGAAGATTTTAGTGGATAAAACAAGGTAAGCCTGTTGATATCGTTCTTCCGACGCGTGGTATTGCCGAGCGGA  
 20 TGATTGAGTCTTTATGTTGATGGCTAATGAAACAGTTGCCGAACATTTAGCAAGTTGGATTGCTTTTATCTAT  
 CGAATTCACGAGGAGCCTAAGGCTGAAAAGGTTCAAGAGTTTATTGATTATGCTTCGAGTTTTGGCTTGGCATT  
 ATGGAAGTCCAGTGAGATTAGTCAGGAGGCACTTCAAGACATCATGCGTGTGTTGAGGGAGAACCTTATGCAG  
 ATGTATTGTCATGATGCTTCTGCTCTATGACAGGAGCTCGTTATTCGGAGCACAATCAGGCGCACTATTGGACT  
 AGTGTCTGACTATTATACTCACTTTACCAGTCCAATTCGCTTATCCAGACCTTCTGTTACCCTATGATTCGGG  
 25 ATTACGGCCGTTCTAAGGAAATAGCAGAGCATTGTAACAAGTGATTCCAGAGATTGCCAGCCAGCTTCCAAAC  
 GTGAACGTCGTGCCATAGAAGCTGAGCGTGAAGTCGAAGCCATGAAAAAGGCTGAGTATATGGAAGAAATACGTGG  
 GTGAAGAGTATGATGCAGTTGTATCAAGTATTGTCAAAATTCGGTCTCTTTGTCGAATTGCCAAACACAGTTGAAGG  
 CTTGATTACATCACTAATCTGCTGAATTTATCAATTCAGTGGCGTGAATTTGACTCTTCGTGGAGAAAAATCA  
 GGTATCACTTTCCGAGTGGGTGAGCAGATCCGTATCCGTGTTGAAAGAGCGGATAAAATGACTGGAGAGATTGAT  
 30 TTTTCATTGCTACCTAGTGAGTTTGTATGTGATTGAAAAAGGCTTGAACACAGTCTAGTCGT  
 AGTGGCAGAGGCGGTGATTCAAACTCGTCTGGATGAAGAAAGGAAAAAGCAAACTTTTACAAGGAAGTAGCTAAGAAAG  
 TAAGCGTAAGCATTCAAAAAAGACAAGAAAGAAAAAGGAAAGCAAACTTTTACAAGGAAGTAGCTAAGAAAG  
 GAGCCAAGCATGGCAAGGGCGAGGGAAGGTCTGTCGCAAAAAATAA  
  
 4137.2  
 35 ATGGGCACAACAGGATTTACAATAATTGACTTAATTATCTTGATTGTTTATTTACTTGGCGTGTGGTTGCAGGTAT  
 CTATTTCTCTAAAAAGAGATGAAAGGAAAAAGAGTTCTTTAAAGGAGATGGTTTCGTTTGGTATGTTACTTCG  
 GTATCCATTTTGGCACAATGCTCAGTCCGATTTCTTGGGACTCGCTGGTAGCTTATGCAAGTAGCTGGAT  
 TTTATGGTTTGTCTCAATTAGGGATGGTAGCTATTCACCTGACAATTCGTTTTATCTTACCTATCTTGCACGGA  
 40 TAGACATCGATACGGCATATGATTACTTGGATAAAGCTTTTAAATCTAAAGCACTTCGTATTATTCAGCACTCTT  
 GTTATATTATTTCAATTGGGACGTATGTCTATCATTTATGTACCTCCATCAGCTGGTTTATCAGTATTGACAGGAA  
 TGACATCAATATTTTGAATTTTATGTTGAGGTGAGTTGCAATTTGTTTATTCTTATCTAGTGGTCTTCAATCCGTA  
 TTATGGACAGACTTTATTCAGGTGTGATTCTGATTAGTGGTGTCTTTAGCTTTATTTGACTGATTGCTAATAT  
 TAAAGGTGGCTTTGGTGAGTAGCAGAAACATTAGCAAAACGGGAAATTCCTTGCTGCAAAATGAAAACTTTTCGA  
 45 TCCTAAGCTTGTCTTCAAACTCCATCTTTTAAATGTGATGGGTTGAGGCTTTACAATCTTGCTTCTCTATGCTCATC  
 TCAAGATTTGGTTCAACGTTTACTACAACACAAAAATTAAGAAACTTAATAAGATGTTGTTCAAAAACGGTGT  
 TTGTCACTTGCAACTGCAACAGTCTTTTACTTGATTGGTACAGGCTTGTACGTATTCTATCAAGTACAAAAATGCAG  
 ATAGTGCAGTAGCAATATCCCTCAAGACCAAACTTTATGTACTTTATGTCATACCAGTTACCAGTAGGTATCAC  
 AGGTTTGATCTTGGCAGCGATTTATGCAGCATCTCAATCAACTATTTCAACAGGTTTGAACCTCTGTTGCAACTTCA  
 50 TGGACATTGGATATTCAGATGTCTTTCTAAAAATATGTCAGACAATCGTCGTACGAAAAATGCAACAATCGTAT  
 CTCTAGCAGTAGGTTTATCTCAATTGGTGTTCATTGTCTATGGCTCACTCAGATATTAATCTGCATACGAATGG  
 TTCAATAGTTTCTAGGAGTGTACTTGGTCTACTTGGTGGTGAATTTATCTTGGATTGTTTCTAAAAAAGCAAA  
 TAAACAAGGTGCTTATGCAGCGCTGATTGTATCAACCATCGTCATGGTATTTATTAATACTTCTCTCTCAACA  
 GCTGTTAGCTACTGGGCATATTCTTGATTCTCAATCTCTGTATCAGTAGTTTCAGGTTATATTGTATCTGTTCTTAC  
 55 TGGAAATAAAGTATCTGCACCTAAATATACAAGATTATGATATTACAGAAATTAAGCGGATTCAAGTTGGGA  
 AGTTCTGCTACTAA  
  
 4138.1  
 60 ATGAAATTTAGTAAAAAATATATAGCAGCTGGATCAGCTGTTATCGTATCCTTGAGTCTATGTGCCTATGCACTAA  
 ACCAGCATCGTTCCGAGGAAAAAAGGACAATAATCGTGTCTCTTATGTGGATGGCAGCCAGTCAAGTCAGAAAA  
 GTGAAAACTTGACACCAGACAGGTTAGCCAGAAAGAGGAATTCAGGCTGAGCAAAATTTGAATCAAAATTCAG  
 ATCAGGGCTATGTAAAGTCAACGGTGACCACTATCAATTAATGGAAGGTTCTTATGATGCCCTCTTTAG  
 TGAAGAAGTCTTGATGAAGGATCCAACTATCAACTTAAAGACGCTGATATTGTCAATGAAGTCAAGGGTGGTTA  
 TATCATCAAGGTGATGGAATAATATGTCTACTGAAAGATGCAGCTCATGCTGATAATGTTTCAAACTAAAGAT  
 65 GAAATCAATCGTCAAAAAAGAACATGTCAAGATAATGAGAAGGTTAACTCTAATGTTGCTGTAGCAAGGTCT  
 CAGGGACGATATACGACAAATGATGGTTATGTCTTAATCCAGCTGATATTATCGAAGATACGGGTAATGCTTATA

TCGTTCTCATGGAGGTCACCTATCACTACATTCCCAAAAGCGATTTATCTGCTAGTGAATTAGCAGCAGCTAAAGC  
ACATCTGGCTGGAAAAAATATGCAACCGAGTCAGTTAAGCTATTCTTCAACAGCTAGTGACAATAACACGCAATC  
TGTAGCAAAAGGATCAACTAGCAAGCCAGCAATAAATCTGAAAACTCCAGAGTCTTTTGAAAGGAACTCTATGA  
5 TACACCTAGCGCCCAACGTTACAGTGAATCAGATGGCCTGGTCTTTGACCCTGCTAAGATTATCAGTCGTACACCA  
AATGGAGTTGCGATTCCGCATGGCGACCAATTACCACTTTATTCCTTACAGCAAGCTTTCTGCCTTAGAAGAAAAAG  
TTGCCAGAATGGTGCTATCAGTGGAACCTGGTTCTACAGTTTCTACAAATGCAAAACCTAATGAAGTAGTGTCTAG  
TCTAGGCAGTCTTTCAAGCAATCCTTCTTCTTAACGACAAGTAAGGAGCTCTCTTCAGCATCTGATGGTTATATTT  
TTAATCCAAAAGATATCGTTGAAGAAACGGCTACAGCTTATATTGTAAGACATGGTGATCATTTCCATTACATTCC  
10 AAAATCAAATCAAATTGGGCAACCGACTCTTCCAAACAATAGTCTAGCAACACCTTCTCCATCTCTTCCAATCAAT  
CCAGGAACCTTCACATGAGAAAAATGAAGAAGATGGATACGGATTTGATGCTAATCGTATTATCGCTGAAGATGAA  
TCAGGTTTTGTCATGAGTCACGGAGACCACAATCATTATTTCTTCAAGAAGGACTTGACAGAAGACAAATTAAG  
GTGCGCAAAAACATTTAG

4139.1  
15 ATGAAAAAAGAGCAATAGTGGCAGTCATTGTACTGCTTTTGATTTGGGCTGGATCAGTTGGTCAAACTCTATATCG  
TCCAGCAGATTCCTAGGTTGAAGTGCGCTCTGGATCCCAATTTCTGTTAGCTTGACCTGCAAAATCGAGG  
TGCAGCCTTTTCTATCTTACAAGATCAGCAGCTGTTATTGCTGTCTATTACTCTGTTGTCGTGATAGGTGCCATTT  
GGTATTTACATAAACACATGGAGGACTCATTCTGGATGGTCTTGGGTTTGACTCTAATAATCGCGGGTGGTCTTGG  
20 AAACCTTATTGACAGGGTCAGTCAGGGCTTGTGTGGATATGTTCCACCTTGACCTTTATCAACTTTGCAATTTTCA  
ATGTGGCAGATAGCTATCTGACGGTTGGAGTGATTATTTATTGATTGCAATGCTAAAAGAGGAAATAAATGGAA  
ATTAA

4139.5  
25 ATGAATACAAATCTTGCAAGTTTTATCGTTGGACTGATCATCGATGAAAACGACCGTTTTACTTTGTGCAAAAGG  
ATGGTCAAACTATGCTCTTGTCTAAGGAAGAAGGCCAACATACAGTAGGGGATACGGTCAAAAGGTTTTGCATACA  
CGGATATGAAGCAAAACTCCGCTGACAACCTTAGAAGTGAAGTCCACTCAGGACCAATTTGGTTGGGGACGGT  
TCACAGAGTTTCGTAAAGCACTTGGGTGTCTTTGTGGATACAGGCCCTTCTGACAAGGAAATCGTTGTCTACTCGA  
TATTCTCCCTGAGCTCAAGGAACTCTGGCCTAAGAAGGGCGACCAACTCTACATCCGTCTTGAAGTGGATAAGAA  
AGACCGTATCTGGGGCTCTTGGCTTATCAAGAAGACTTCAACGTCTTGTCTGCTGCTGCTACAACCAATGTCAG  
30 AACCAAACTGGCCAGCCATTGTTTACCCTCTCAAGCTGTCAAGGAACTTTGTTTACCTACCAGAAAATAATATGC  
TTGGTTTTATTATCCTAGCGAGCGTTACGCAGAGCCACGTTTGGGGCAAGTATTAGATGCGCGCTTATTGGTTT  
CCGTGAAGTGGACCGCACTCTGAACCTCTCCCTCAAAACCAAGCTCTCTTGAATGTTGGAAAACGATGCTCAGATG  
ATTTTGACTTATTTGAAAAGCAATGGCGGTTTCATGACCTTAAATGACAAGTCATCTCCAGACGACATCAAGGCAA  
35 CTTTGGCATTTCTAAAGGTCAGTTCAAGAAAGCTTTAGGTGGTCTTATGAAGGCTGGTAAAATCAAGCAGGACCA  
GTTTGGGACAGAGTTGATTTAG

4139.8  
40 ATGAAAGATGTTAGTCTATTTTTATTGAAAAAAGTTTTCAAAAGCCGCTTAAACTGGATTGTCTTAGCTTTATTTGT  
ATCTGTACTCGGTGTTACCTTTTTATTTAAATAGTCAGACTGCAAACTCACACAGCTTGGAGAGCAGGTTGGAAGT  
CGCATTTGACGCCAACGAGAGGGCTATCAATGAAAATGAAGAGAACTCTCCCAATGTCTGATACCAGCTCGGAG  
GAATACCAAGTTTGCTAAAAAATAATTTAGACGTGCAAAAAAATCTTTGACCGGAAAGACAGAAATTTGACTTTAT  
TAAAAAGAAGGGCGCTGGAAGAAGCCTACTATTTGACAGTGGCAAGATGAAGAGAAGAAATTGAATTTGTATCAA  
ATGACCCGACTGCTAGCCCTGGCTTAAAAATGGGGTTGACCGCGAACGGGAAGATTTACCAAGCCCTGTATCCCT  
45 TGAACATAAAAAGCACATACTTGGAGTTTCCGACCCAGGGATTGATCAGATTGTCTGGATTATAGAGTTATCAT  
CCCAAGTTTGTGTGGTTGCTATTAATTTTATGCTAACACAACCTATTTGCAGAAAAGATACAAAATCATCTGGAC  
ACAGCTCACTTATATCCTGTTTCAAAAGTGACATTGCAATATCCTCTCTTGGAGTTGGAGTGGGATATGTAAGT  
TGCTGTTTATCGGAATCTGTGGCTTTTCTTTCTAGTGGGAAGTCTGATAAGTGGTTTGGACAGTTAGATTATCCC  
TACCCAAATTTATAGCTTAGTGAATCAAGAAGTAACTATTGGGAAAAATACAAGATGTAATTATTTCTGGCTTGTCT  
50 TAGCTTTCTTAGCTTTATCGTCAATTGTGGAAGTTGTGTACTTGATTGCTTACTTTTCAAGCAAAAAATGCCTGTC  
CTCTTTCTTCACTCATTGGGATTGTTGGCTTATTGTTGGTATCCAAACCACTCAGCCTCTTCAAGGATTGACACA  
TCTGATTCCCTTTACTTACTTGGCTTCAAGTGGAGATTTATCTGGAAGATTACCTAAGCAGATTGATAATGTGCTATC  
TAAATTGGAGCATGGGAATGGTCTTACTTCTTGCCTGATTATCTTTTGCTATTGGGAATCTATTTATTGAAAAGA  
TGGGGAAGTTACAGAAAAAAGAAATTTTAAATAGATTCTAG

4141.1  
55 ATGATGAAGTTCATATTGGATATTGTTAGTACACCAGCTATTTTATGAGCTTTAATTGCAATCTTAGGATTAGTTCT  
TCAGAAGAAGAAATACCTGATATTATTAAGGTGGAATTAAGACCTTTGTTGGTTTCTTAGTTGTATCTGGTGGT  
GCAGGAATTTGACAAAATCTTTAAATCCATTGGTACCATGTTTGAGCATGCTTTTCATTTATCTGGCGTTGTGGC  
60 GAATAATGAAGCAATGTAGCTGTAGCTTTAAACAATATGGCTCAGCTACTGCAATGATTATGTTTGCAGGCGATG  
GTGTTCAATATCTTAATCGCTCGTTTTACTCGATTTAAATATATTTTTTAAACAGGGCACCACACTCTATATAGGC  
ATGTATGATTGCGGTCAATTTATCAGTTGCTGGCTTTACTAGCTTGCCTCTCATCTTACTAGGAGGATTAGCACTCG  
GTATTATTAGAGTATTTCCCAAGCATTGTGCAAAAAATATAGGTTCAATTAAGTGGAAATGACAAGGTAGCTTT  
AGGTCAATTCAGTTCTTTGGGATATTGGTTGAGTGGTTTTACTGGTAGCCTTATCGGTGACAAATCAAAATCAACA  
65 GAGGACATTAATTTCCAAAGAGTTTAGCTTTTACGTGATAGTACTGTTAGTATTACTTTATCCATGGCAGTTAT  
TTACATTATTGATGCTATCTTTGAGGGTCAGAAATATATAGAAAAAGAAATCAGTAGTGGTACAAGTGGTCTAGTT



2ATGCTTTACAATTAGCAGGTCAATTTGCAGCAGGGGTATTTGTTATTTAGCAGGTGTTCCGCTTATTTGGGGCA  
AATTGTTCCAGCCTTTAAAGGTATTTAGAGCGTCTGTACCTAATTCAAAACCTGCTTTGGATTGTCGATTGTTT  
ATACCTATGCACCCCAATGCAGTTCTAATTGGATTATCTCTAGTTTGTGGTGGTTTAGTAAGTATGGTAATTATG  
ATTGCTTCAGGAACGGTTGTTATCTTACCAGGTGTTGTGCCTCATTTCTCTGTGGAGCGACTGCAGGTGTCATTGG  
5GAATGCATCTGGTGGTGTTCGTGGAGCCACTATTTGGAGCATTTTACAAGGTATTTAATCAGTTTCTCCAGTCT  
TTTTAATGCCAGTTTGGGAGGACTTGGTTTCCAAGGATCAACTTCTCAGATGCAGATTTGGTCTATCAGGAATT  
ATTTTAGGAATGTTAAATCAATTTGGCTCACAAGCAGGCATTGTGATTGGTCTTGTCTTATTCTAGCAGTTATGTT  
TGGAGTATCCTTTATTAAGCCATCTGCAACGGAGGAATAA

104142.3  
ATGATTAACCAATTTCTCTGCCCCTTCGGTCATTCTCTTTCTATCCCTATCATAACTTATCTTTTTTCCCATCT  
TCTAATCTTAACATTTGGCTATCTACCCAACTATCTTGGCAGAGATTTATGCCTTCCCCTTAGCTACTGCAACTAT  
GGCTGCTATTTAAGTTTCTTATTTTCTCTATCTTTTACAAGAAAAATAACAAATACGGTTTTACTCTGGCA  
15TTTTGCTCTTACTATCGCTCATATTACTATTATTCGGAACAGATAAAACCCTTTCTTCTGCATCAAAATAGACTAAA  
ACCTTAAAAATTAGTAACCTTGGAACTGCTAATCAAAATAGAAGCACAACATATTGAGCGAAATTTTAGCCATTTTG  
ACGCCGATATGGCTATATTCCTGAACTAGCTACCAATATCAGAGGTGAGCAAGAAAAACAGAGAAATCAAACTAT  
TGTTCATCAAGTTGGACTTCTATGGCCAACTATGATATTTTCACTTCTCCACTACCAATAGTGGAAATAGCTCCT  
GTGACTGTGATTGTCAAGAAAAAGTTATGTTTCTATACAGAAGCTAAAACTTTTATACAACACGGTTCGGGACAA  
TTGATTACATTCGAGAAAAACAAATATACCAGATATCATTCGCTTGCATATCGCCCTCTCTGCCAGGTTTAAT  
20GGAAATCTGGAAGCAAGACTTAAACATCATTCAATTAATGCTTCAAAATATCAGGCTATTAATGCAAGT  
GATTTTATGCAACTATGCGTCATGGAGCACTTGCAAAATAAGCTCTCATAGGGACGCATTAATGCACTGCCA  
CCTTTTGAAGAGGAAGCTTGAATAGCCAAAGTCCAAACTTTTAAATGCAACAATAGATCATATTTATTGCTTA  
AAAACCACTACTATGTTAAAGATTTAGACATTGTAAGTTTCAAACTCTGATCATAGATGTATTTTACAGAAAT  
CACATTTTAA

254142.4  
ATGAATCCAATCCAAGATCTTGGGCTTATGTCAGCAGAAAGCGACTGAGAAGTTTATTTTATTTCTGATTTTAT  
TGGTCTTATTGGCCGGAATTTAGCCTGTTTACTCTGATGAAGTCCAACAAAAACAGTAGAAAGCAATCTTTATAA  
30ATCACTCAATACATCTTTTCTATTAAGAAGATAGAGAATGGTCAGACATTCAGATTGTGAGACCTAGCATCTGTA  
AGCAAGATTAAGGGGCTGGAAAAATGTCTCTCTGAACTTGAGACGGTTCGCAAACTAAAAGACAAGGAAGCAGTG  
ACTGGCGAGCAGAGCGTGGAGCGTGATGATTTATCAGCTGCAGACAATAACTTGGTTAGCTTAACGGCTCTTGAG  
GATTCATCCAAGGATGTAACCTTTACCAGTTCGGCTTTCAATCTAAAAGAAGGGCGACACCTTCAAAAAGGGGAT  
TCCAAGAAAACTCTTATCCACGAAGAATTGGCTAAGAAGAACGGTCTTTTCGCTTCATGACAAGATTGGCTTGGATG  
CTGGTCAGTCTGAATCTGGAAGGACAAACAGTAAAGATTGAGATTATCGGCATCTTTCTGGTAAAAACAAG  
35AGAAATTCACAGGCTTGTCTTCTGACTTCAGTGAAAAATCAAGTCTTTACAGACTATGAAAGTAGCCAAACCCTTT  
GGGCAATAGTGAAAGCTCAAGTCAGTGCAGCAGCTTCTATGTAGAAAACTCTAAGGAAATGGACGGACTCATGAA  
GCAGGTAGAAAACTTGGCTTGGAAAAATCAAGGCTACCAAGTCGAAAAGGAAAAACAAGGCTTTTGAACAAATCAA  
AGACTAGTTGCAACTTTTCAAACTTCTGACCTTCTCTTATGGGATGTTGATAGCAGAGCTGGAGGCTTAA  
40ATTCTGGTTTTGTCTCTCTGGTTGAGAGAACGGGCTATGAAGTGGGATTTACTTGCATTTGAAAAAGGCAAGA  
GCTCGATCTTCTCAATCTGTTTAGAGGTAGTTTGGTATCTCTTGGAGCTTTGCTTCCAGCATTTGTTGCAGGA  
AACGCAATCACAACCTTACCTACTCCAACTCTACTAGCAAGTGGAGATCAGGCAAGCTTACAAGATACACTAGCC  
AAAGCAAGCAGTTTATCAACTAGCATCTTATCTTTGCAGAAATCCTATGTTTTTCTAGTTCTGCTTAGTTGCTTATC  
TGTAGCCCTTTGTTTCTATTCTTATTTAGAAAAATCAGCGAAAGAAATTTATCATCTATTAGTTAA

454142.5  
ATGTTACACAACGCATTTGCCTATGTTACAAGGAAGTTTTTCAATCGATTGTCTCTTCTGATTATTCTCCTCAT  
GGCGAGCTTGAGTTTGGTGGGCTTGTCAATCAAGGGAGCTACTGCCAAGGCTTCTCAGGAGACCTTTAAAAATATC  
ACCAATAGCTTCTCCATGCAAAATCAATCGTCGGTCAACCAAGGAACGCCCTCGTGGTGTGGGAATATCAAGGGT  
50GAAGACATCAAAAAATCACCGAAAAAAGGCCATTGAGTCTTATGTCAAAAGTATCAACGCTATCGGAGATTG  
ACTGGATATGACCTGATTGAAACGCCAGAAACCAAGAAGATCTCACTGCTGATCGTGCAAGCGTTTGGAAAT  
AGCTTGATGATTACAGGTGTCAATGACTCCTTAAAGAAGACAAGTTTGTCTCTGGTTCTTATAAACTAGTCGAAG  
GAGAGCACTTAACCAACGACGACAAGGATAAAATCCTCTTGCAAGGACTTGGCAGCCAAACACGGCTGGAAA  
GTAGGGGACAAGGTTAACTGGACTCTAATATCTACGATGCAGATAATGAAAAAGGAGCCAAAGGAACAGTTGA  
55AGTGACAATCAAGGGACTCTTTGATGGTCATAATAAGTCAGCAGTAACCTACTCACAAGAACTTACGAAAAAC  
AGCTATTACAGACATTCACACTGCTGCAAACTTTATGGATACACAGAAGACACAGCCATTTATGGGGACGCAAC  
CTTCTTTGTAACAGCAGACAAGAACTTGGATGATGTTATGAAAGAGTTGAATGGCATCAGTGGTATCAACTGGAA  
GAGCTACACACTCGTCAAGAGCTCCTCTAATACCCAGCTTGTGAGCAATCTATCTCTGGTATGTACAAGATGGCC  
AACCTCCTCTTCTGGGGTAGCTTGAGCTTCTCAGTTCTCCTCTGCTCTTGGCTCTTGGTCAAGCCTTGGATCAACGCCCG  
60TCGCAAGGAAGTGGGAATTTCTCTCTCTATCGGCCTCAAGCAGGCAAGTATCTTGGGTCA  
ATTCATCACCGAATCTATCTGATTGCTATCCCTGCTCTAGTTTCTGCTTACTTCTAGCTAATTACACTGCCCGTG  
CAATTTGGAAACACTGCTCTTGGCAATGTGACTTCAGGTGTTGCCAAACAGGCTAGTAAGGGCGCTCAAGCCTCTA  
ACCTTGGTGGTGAGAAAGTAGATGGCTTTAGCAAGACCTTGTGAGCCTAGACATTTCCATTGACATCAGAA  
CTTTATCATCATTTTGTCTTGGCTTGGTCTAGTGGTCTCGTTATGGCGCTTGTCTCAAGCAATCTCCTTAGAA  
65AACAACCAAAAGAGCTCTTGTCTGGATGGTGAATAA

## 4144.1

ATGTCACAGGATAAACAAATGAAAGCTGTTTCTCCCTTCTGCAGCGAGTTATCAATATCTCATCGAATTGTCGGTG  
GGGTTGGGAGTTTGATTTTCTGTATTTGGGCTTATCAGGCTGGGATTTTACAATCCAAGGAAACCTCTCTGCCTTT  
5 ATCCAGCAGGCAGGCATCTGGGGTCCACCTCTCTTTATCTTTTACAGATTTTACAGACTGTCGTCCCTATCATTC  
AGGGGCCCTTGACCTCGGTGGCTGGGGTCTTTATCTACGGGCACATCATCGGGAATCTACAATATATCGGCATC  
GTGATTGGCTGTGCCATTATCTTTTATCTAGTGCGCTATACGGAGCTGCCTTTGTCCAGTCTGTCTCGTCAGCAAGC  
GCACCTACGACAAGTACATCGACTGGCTAGATAAGGGCAATCGTTTTGACCGCTTCTTTATTTTATGATGATTTG  
GCCATTAGCCAGCTGACTTTCTCTGTATGCTGGCTGCCCTGACCAAGATGAGCTTCAAGCGCTACATGACCATC  
10 ATCAITCTGACCAAAACCTTTACCCTCGTGGTTTATACCTACGGTCTGACCTATATTATTGACTTTTCTGGCAAT  
GCTTTGA

## 4144.2

ATGAGAAATATGTGGTTGTAATCAAGGAAACCTATCTTCGACATGTGAGTCATGGAGTTTCTTTTATGTTGA  
TTTCGCGTTCCTCTTTTAGGAATCTCTGTAGGAATTGGGCATCTCAAGGTTCTTCTATGGCTAAAAATAATAA  
15 GTGGCAGTAGTGACAACAGTGCCATCTGTAGCAGAAGGACTGAAGAAATGTAATGGTGTAACTTCGACTATAAA  
GACGAAGCAAGTGCCAAAGAAGCAATTAAGAAGAAAAATTAAGGTTATTTGACCATTGATCAAGAAGATAGT  
GTTCTAAAGGCAGTTTATCATGGCGAAACATCGCTTGAAAAATGGAATTAATTTGAGGTTACAGGTACACTCAATG  
AACTGCAAAATCAGCTTAATCGTTCAACTGCTTCTTGTCTCAAGAGCAGGAAAAACGCTTAGCGCAGACAATTC  
AATTCACAGAAAAAGATTGATGAAGCCAAGGAAAAATAAAAAGTTTATTCAAACAATTCGAGCAGGTGCCTTAGGAT  
20 TCTTTCTTTATATGATTCTGATTACCTATGCGGGTGTAAACAGCTCAGGAAGTTGCCAGTGAAGAAAGGCACCAAAAT  
TATGGAAGTCGTTTTTTCTAGCATAAGGGCAAGTCACTATTTCTATGCGCGGATGATGGCTCTGTTTCTAGTGATT  
TAACGCATATTGGGATCTATGTTGTAGGTGGTCTGGCTGCCGTTTTGCTCTTTAAAGATTGTCCATTCTTGGCTCAG  
CTGGTATTTTGGATCACTTGGGAGATGCTATCTCACTGAATACCTTGCTCTTTATTTGATCAGTCTTTTCATGTA  
25 TCTTTTGGCAGCCTTCTAGGATCTATGGTTTTCTCGCTCAGGACTCAGGAAAGCCTTGTGCGCTTTGATG  
ATTTTGATTATGGGTGGTTTTTTGGAGTGACAGCTCTAGGTGACAGCTGGTGACAACTCTCTTGAAGATTGGTTCT  
TTATATCCCTTTATTTGACCTTCTTTATGCGGTTTGAACGATTAAATGACTATGCGGGGGGAGCAGAAGCATGG  
ATTTCACTTGCTATTACAGTGATTTTGGCGTGGTAGCAACAGGATTTATCGGACGCTATGCTAGTCTCGTTCT  
TCAACCGGATGATTTAGGATTTGGAAGAACTTTAAACGTGCCTTATCTTATAAATAG

## 4144.3

ATGACAGAAACCATTAATTTGATGAAGGCTCATCTTCAGTGCGCAGGTTTAAAGAGCAAGAAATCCCCAAGTA  
GACTTAAATGAGATTTTGACAGCAGCCAGATGGCATCATCTTGAAGAAATTTCCAATCCTACTCTGTGATTGTGG  
TACGAAGTCAAGAGAAGAAAGATGCCTTGTATGAATTGGTACCTCAAGAGCCATTCCGCCAGTCTGCTGTTTTCT  
35 TCTCTTTGTCGGAGATTGTAACCGAGCAGAAAAAGGGAGCCCGACTTCATACCGACACCTTCCAACCCCAAGGTGT  
GGAAGGTCTCTTGATTAGTTCCGTCGATGCAGCTCTTGCTGGACAAAAAGCCTTGTGGCAGCTGAAAGCTTGGGC  
TATGGTGGTGTGATTATCGGTTTGGTTCGATACAAGTCTGAAGAAGTGGCAGAGCTCTTAACCTACCTGACTACA  
CCTATTCTGTCTTTGGGATGGCACTGGGTGTGCCAAATCAACATCATGATATGAAGCCGAGACTGCCACTAGAGA  
ATGTTGTCTTTGAGGAAGAATACCAAGAACAGTCAACTGAGGCAATCCAAGCTTATGACCGTGTTCAGGCTGACT  
40 ATGCTGGGGCGCTGCGACCAAGCTGGAGTCAGCGCCTAGCAGAACAGTTTGGTCAAGCTGAACCAAGCTCAA  
CTAGAAAAATCTTGAACAGAAGAAATTATTGTAG

## 4146.1

ATGTTAAAACTTATTGCTATTGTTGGAACAAATTCAAAAAGTTCTACAAACCGTCAATTGCTTCAATACATGCAAA  
AACACTTTACTGACAAAGCTGAAATTTGAACCTGTTGAAATCAAGGCCATTCTGTCTTCAACAAACAGCTGACAA  
45 GCAAGTACCTGCTGAAATATTGGAAATTGCTGCTAAAAATCGAAGAGGCAGATGGCGTTATTATCGGTACTCTGA  
GTATGATCACTCTATTCCAGCTGTTTTGATGAGCGCTCTTGCTTGGTTGTCTTATGGTATTTACCCACTTTTGAACA  
AACCAATCATGATTACAGGTGCTTCTTACGGTACGCTTGGTTTCATCTCGTGCCCAATTGCAACTTCGTCAAATCTT  
GAATGCTCCTGAAATCAAGGCAATGTTCTTCCAGATGAATTTCTGCTCTCACACTCTCTTCAAGCATTTAAACCA  
50 AGTGGCGACTTGGTTGACCTTGATGTTATCAAGAAATTGGATGCCATCTTTGATGACTTCCGTATCTTTGTAAGAA  
TCACAGAAAAATTACGTAATGCACAAGAAATTACTTCGCAAGATGCTGAAGACTTTGACTGGGAAAAATTTGTA

## 4146.2

ATGAATACCTATCAATTAATAATGGAGTAGAAATTCAGTATTGGGATTTGGAACTTTTAAGGCTAAGGATGGA  
GAAGAAGCCTATCGTGAGTGTAGAACCTTGAAGGCTGTTATCGTCATATTGATACGGCGGCGATTATCAGA  
55 ATGAAGAAAGTGTGGTCAAGCAATCAAGATAGCGGAGTTCCAGTGAAAGAAATGTTCTGTAACCTACCAAGCTTT  
GGAATAGTCAGCAACCTATGAGCAAACTCGTCAAGCTTTGGAAGAAATCTATAGAAAACTGGGCTTGGATTATT  
TGGATTGTATTGATTCAATTGGCCGAACCCAAACCGCTCAGAGAAAAATGACGCATGAAAACTCGCAATGCGG  
AAGTTTGGAGAGCGATGGAAGACCTCTATCAAGAAAGGAAAAATCCGTGCTATCGGCGTTAGCAATTTCTTCCCC  
ATCATTTGGATGCTTGTCTTGAACCTGCAACTATCGTCTCGGTCAATCAAGTTCTGCTGGCGCCAGGTGTGTA  
60 TCAAGATCAAGTCGTAGCTTACTGTGCTGAAAGGGAAATTTATTGGAAGCTTGGGGGCTTTTGGACAAGGAGA  
ACTGTTTGTAGCAAGCAAGTCCAAGAAATAGCAGCAAAATCACGAAAAATCGGTTGCTCAGATAGCTTGGCCTG  
GAGCTTGGCAGAAGGATTTTACCACCTTCAAAATCTGTCAACCTCTCGTATTCAAGCTAATCTTGATTGCTTT  
GGAATTTGAAGTGAATGAGGAGAGAGAAACCTTAAAAACGATTGCTGTTCAATCGGGTCTCCAGAGTTGAT  
65 GATGTGGATTCTAG

4147.1

5 ATGAGGTGCAAAATGCTTGATCCAATTGCTATTCAACTAGGACCCCTAGCCATTGTTGGTATGCCTTATGTATTG  
TGACAGGCTTGATTCTTGGCGTTTATTGACCATGAAAGAAGCACCTAGAAAGAAGATCATACAGACGATATTTT  
AGATTTTATCTTAGTAGCCTTTCCCTTGGCTATTTAGGAGCTCGTCTCTACTATGTTATTTTCCGATTTGATTACTA  
TAGTCAGAAATTTAGGAGAGATTTTGGCCATTTGGAATGGTGGTTTGGCCATTTACGGTGGTTTGATAACTGGGGCT  
CTTGTGCTCTATATCTTGTGACCGTAACTCATCAATCTTGGGATTTTCTAGATATTGGGGCGCCTAGCGTTAT  
GATTGCTCAAAAGTTTGGGGCGTTGGGGTAATTTCTTTAACCAGAAGCTTATGGTGCAACAGTGGATAATCTGGAT  
TATCTACCTGGCTTTATCCGTGACCAGATGTATATTGAGGGGAGCTACCGTCAACCGACTTTCTTTATGAGTCTC  
TATGGAATCTGCTTGGCTTTGCCCTTGATTCTGATTTTATAGACGGAAATGGAAGAGTCTCAGACGAGGTCTATCAC  
10 GGCTTTTACTTGATTGGTATGGTTTCGGTCTGATGGTTATCGAAGGTATGCGAACAGATAGTCTCATGTTCTTCG  
GCTTCGAGTGTCCCAATGGCTGTCACTTGTCTTATCGGTCTCGGTATAATGATCGTTATTTATCAAAATCGAAA  
GAAGGCCCTTACTATATTACAGAGGAGGAAAACTAA

4147.2

15 ATGGGTAATATCCTCAATCCTTTTAGGAACCGTTTCAGGTGCAGCTCTTGCCTTGTTTTAAAGTGATAAGG  
GCAAAAGTTTGCAGTCAGGCTCAAGATTTTCTAGATGATTGAGAGAAGATCCGGAGTATGCCAAGGAGCAAG  
TCTGTGAAAACTGACAGAAGTTAAGGAGCAGGTACAGATTTTGTCTGAAAAAAGAACAGGTTGAGTCAG  
GTGAAATCACTGTGGACAGTATACTTGTCTAAATCCTATGCTTTTCAAGCGACAGAAGCATCAAAAAATC  
20 AATTAATAATCTCAAGGAGCAATGGCAAGAAAAAGCCGAAGCTCTTGATGACTCAGAAGAGATTGTGATTGATA  
TAACAGAAGAATAA

4147.3

25 ATGAAAACTAAATTGATCTTTTGGGGCTCTATGCTCTTTCTCTCTCCCTCTCCATCCTTCTGACCATTTATCTGGC  
TTGGATTTTCTATCCTATGGAGATTCACTGGCTAACTTAACGAATCGAGTCTATCTAAAACAGAAACCATTCAA  
TACATTTTCTATCTTGATGAATATCTGACCAATCCTTTTAGTCAGGTCTTACAGATGCCTGATTTTCGTTTCGTC  
AGCAGCTGGTCTGCACCATTTCCGAGTGGTCAAGAACTCTTTTCAATTTGGTTAGCTAGTAGCTCTAGTGACACTG  
CCAAGTTTCTATGCTTTGTCAATAGGATTGTGAAAAAGGACTTTTGTCTCTTTATCGAAAAAGTCTCTGGCTCT  
30 AGTAGCTTACCTGTGATGATTGGACTTGGGGAGTTTGTATTGGTTTGGACCAATCTTACTCTTTCCATCAAA  
TTCTCTTTGTGGGAGATGATACCTGGCTTTTGTATCCAGCCAAGGATCCTGTTATTATGATTTTCCAGAGACCTTC  
TTCTTCATGCCTTCTCTCTTTTGGCCCTCTATGAAAACTCTTTGGCTATCTGTATCTGAAAAAGTCGTAGGAA  
GTGA

4149.1

35 ATGACTTATCATTTTACTGAAGAATACGATATTATTGTAATTGGTGCGGGACACGCTGGGGTTGAGGCTTCTCTGG  
CCGCTAGCCGTATGGGCTGTAAGGTCCTGCTTGCACCATCAATATTGAAATGCTGGCTTTCATGCCTTGTAAATCC  
CTCTATCGGTGGTCTGCCAAGGGGATTGCTGCGGTGAAGTCGATGCCCTCGGTGGCGAGATGGCCAAAACCAT  
GACAAGACTTACATCCAGATGAAGATGCTAAACACAGGGGAAGGGGCCAGCTGTCCGTGCCCTTCGTGCGCAGGCT  
40 GACAAGGAACCTTACTCTAAGGAGATGCGCAAGCGTTGAAAAACCAAGAAAACTGACCTTCGTCAAAACCATG  
ATTGATGAGATTTTGGTGGAAAGATGGCAAGGTTGTCGGTGTGCGTACAGCCACCCATCAAGAAATATGCTGCTAAG  
GCTGTTATTGTGACGACAGGGAAGTCTCTCCGTGGGGAAATATCATCGGAGACCTCAAGTACTCATCAGGTCTTA  
ACCAAGCTTGGCTTCTATTAACCTAGCTGACAATCTCAAGGAAGTGGGTCTCGAAATCGGTCTTTCAAGACAGG  
AACCCCTCCAGCTGCAAGGCTTCTTCTATCAATTACGATGTGACAGAAATTCAGCCAGGAGACGAAAGTGCCTAAT  
CATTTCTCATACACTTCAAGTATGAGGATTATGTCAAGGACCAAGTACCATGCTGGTTGACCTATACCAATGGTA  
45 CCAGTCATGAGATTATCAAAAAACCTCCACCGTGGCCTATGTTTACAGGTGTGGTCAAGGGAGTGGGGCTC  
GTTACTGTCCGTCGATTGAAGACAAGATTGTGCGCTTTGCGGACAAGGAACGTCACCAACTCTTCTTGAGCCAGA  
AGGGCGCAATACTGAGGAAGTCTATGTGCAAGGACTTTCAACAGTCTGCTGAGGATGTCCAGCGTGACTTGGT  
GCATTCCATCAAGGTTTGGAAAAATGCAGAGATGATGCGGACAGGTTATGCTATTGA  
GTATGATATGGTCTTGCCTCATCAGTTGCGTGCGACTTTGGAACCAAGAAAAATCTCAGGTCTCTTCACTGCTGGT  
50 CAGACAAATGGAACATCAGGTTACGAAGAGGCAAGGCCAAGGGATTATCGCGGGTATCAATGCGGCTCTGAA  
AATCCAAGGCAAGCCTGAATTGATTTTGAAGCGCAGTGATGTTATATCGGGGTGATGATCGACGACTTGGTGAC  
CAAGGGAACCATGAACCTACCGTCTCTTGAACGCTGCTGTAATACCGTCTCATTCTTCGTATGACAATGGT  
GATATGCGCTTGACTGAGATGGGACGCGAGATTGGCTTTGTGGACGATGAACGCTGGGCTCGTTTGAATCAAG  
55 AAAAAATCAATTTGATAATGAGATGAAGCGCTAGACAGTATCAAACTCAAGCCAGTCAAGGAAACCAATGCCAAG  
GTTGAGGAGATGGGCTTCAACCCCTTGACCGATGCAGTGACAGCCAAGGAATTCCTTCCCGCTCCAGAAATTTCT  
ACCAAGATGTGGTGGCTTCTATCGGACGCTGCAGAAAGACTTGGATGACAAGATTATCGAATTGATTGAAACAG  
AAATCAAGTATGAAGGCTATATTTCCAAGGCCATGGACCAAGGTTGCCAAGATGAAACGCATGGAAGAAAAACGCA  
TTCCGGCCAATATCGACTGGGATGACATTGATTCTATCGCAACCGAAGCCCGTCAGAAAGTTCAAACTCATCAATCC  
60 AGAAACCATCGGCCAAGCCAGCCGATTTTCGGGAGTAAACCCAGCAGATATTTCTATTTTGTGTTGATCTGGAA  
GGTAAAAATCGTAGTATTTCTAAAACTCTTCAAAAAATCAAAATGA

4149.2

65 ATGAAAGTATTAGCTTTTGATACGTCCAGCAAGGCTCTTCTCTGGCTATTTAGAGGATAAGCAGGTTCTTGGCG  
AGACGACGATTAATATTAAGAAAAATCACAGTATTACTCTATGCCTGCCATCGATTTTGTATGGCAAGTTTGGAA

5 TTGGACACCCAAGGATTTGGACCGAATCGTGGTAGCTGAAGGGCCGGGTAGCTATACAGGCTTGCGAATTGCGGT  
AGCAACTGCTAAGACCTTAGCTCACACCTGAACATCGAGTTGGTTGGTATGTCGAGTCTCTTGGCTCTGGTGGCC  
CATCAACAAGAAGGTTTGTGTCCCCTTGATGGATGCGCTCGCAATAATGTTTATGCAGGATTTTATGAAAAATG  
CCAAACCTGTATGGCAGAAGCGCACCTATCTTTGAAGAGGTGCTAGAAAAATCAAGGGTACTAGTCAGGTAA  
CCTTTGTGGGAGAGTTGGCCCTTTGTTGAGCAGATTCAAAAAACATTGCCAAGGACTGATTACAAAGAAACATT  
GCCCAATGCAGCTAATCTAGCTCTTTGGCTGGGACAAGGAAGCAGACTCCTTGCATGATTTTGTGCCGAATTAC  
CTCAACGAGTCGAGGCTGAGGAAAACCTGGCTCAAGAACCATACCGAGTCTGGCGAGTCTTACATTAAACGCCTA  
TGA

10 4149.3  
ATGATAGAAATCAAGCGAATTCAACAACAGCCTGACCTAGCTCAAGCCATCTACGCTGTTATGGCAGCTGTTTACC  
TAGTCAGTCTTGGACTCTGGAGCAAATCCAAGCAGATCTGTCCAAGACCAGACTTGGTATGCATTGGCTTATGA  
TGGGGCAGAAGTGATTGGATTTCTAGCTGTGCAGGAGAATCTTTTGAAGCAGAAGTCTGCAAAATCGCTGTCAA  
15 AGGAGCTTATCAGGGTCAGGGGATTGCGTCagCCTTGTGTTGCTCAATTGCCGACAGACAAGGAAATTTCTCGAA  
GTCAGACAGTCAAATCAACGAGCGCAAGCATTTTACAAGAAAGAAAAGATGACAGTTATCGCTGAGCGAAAGGC  
CTACTACCATGACCCAGTCGAGGACGCCATTATCATGAAGAGAGAAATAGATGAAGGATAG

20 4152.2  
ATGACAAAAACAAGTCTTATTAGTGGATGATGAAGAACACATTCTGAAATTGCTTGACTACCATTTAAGTAAGGAA  
GGCTTTTCTACTCAATTGGTGACAAATGGCAGGAAGGCCCTAGCTTTGGCAGAAACAGAACCCCTTGTATTTATCT  
TGCTTGATATCATGTTACCACAAATAGATGGCATGGAAGTGTGTAAGCGGCTGAGAGCCAAAGGCCCTTAAATCT  
CAATTATGATGGTTTCTGCGAAAAGTGATGAATTTGATAAGGTTTGGCCTTGGAATTAGGGGCTGATGACTACCT  
GACCAAGCCTTTAGCCCTAGAGAATTGCTGGCGCGTGTCAAGGCTGTCTCAGGCGAACTAAAGGAGAACAAAGA  
25 AGGAGATGATTAGATAAATATCGCTGACGATTCTTGGCTATTGGGACCTTGAAGTATACCTGAGCGTCATGAA  
GTCTACAAGGCGAATAAGTTACTGAGTTTGACCCCAAAAGAAATTTGAAAGCGATAAAAATCCGTTTTTGAAGTTT  
TCAAAGTTTCGAAAAGTAACCGCCCAATAA

30 4154.1  
ATGACTACTTTTAAAGATGGATTTTATGGGGTGGTGTGTTGCTGCTCATCAACTGAAGGTGGATGGCAAGAAG  
GTGGCAAGGGAATTAGTGTGCTGATGTTATGACTGTGCTGCTCATGGAGTAGCTCGTGAAATTACTTTGGGAGT  
TTTAGAGGGTAAATATTATCCAAATCATGAGGCGATAGATTTTATCACCGTTATAAAGAAGATATAGCACTTTT  
GCTGAAATGGGATTCAAGTGCTTCCTGACCTCTATTGTCATGGACACGTATCTTTCCAAAAGGTGATGAGTTAGAGC  
CGAATGAAGAAGGATTACAGTTTATGATAATCTTTTGTGAATGCTTAAAGAATGGTATTGAACCTGTATCAC  
35 TCTATCTCATTTTGAATGCCTTATCACTTAGTGACCGAATAATGGTGTGGAAAAATAGGAAATGATTGATTT  
TTTGCTCGTTTTCAGAGAAGTCGATTTTAAACGTTACAAAGATAAGGTTAAATATTGGATGACTTTCAATGAAATCA  
ATAATCAAGCGAATTATCAGGAAGATTTTGACCACTTACTAACTCAGGTATTGTATATGAGGAAGGTGATAATAG  
AGAAGCAATTATGTATCAAGCAGCACATTACGAATTAGTTGCTTCTGCACGAGCTGTAAAAATTTGGTCATGAGATT  
AATCCAGATTTTCAATAGGTTGTATGATTGCGATGTGTCCAATTTATCCAGTTACTTGCAATCCTAAGGATATCTT  
AATGGCAATGAAAGCTATGCAGAAAGCGTTATTATTTGCTGATGTGCATGTTTATAGTAAATATCCTGAGCATATT  
40 TTCAAGTATTGGGAACGAAAAGGTATTTCAAGTTGATTTTACTGCCAGGATAAAGAAAGATTTACTTGGTGGGACTG  
TAGATTACATTGGTTTCAGTTACTATATGTCTTGTCTATCGACTCTCATCGTGAAAAATACTCTTATTTGATTAT  
CTTGAAACAGAAAGATTTAGTGAATAAATTATGTTAAGGCTTCTGAATGGGAGTGGCAAAATGATCCAGAAAGT  
TTGCGTTATGCGTTAAATTTGTTTACAGACCACTATCACTTACCCTCTTATTTGTTGAAATGTTTTGGAGCTAT  
AGATCAAGTTGCAGCAGATGGTATGGTACATGATGATTATAGAATTGAATATCTAGGTGCCCATATTCGTGAAATG  
45 AAAAAAGGCTGTAGTTGAAGATGGTGTGATTAAATGGGTTTACTCCATGGGGATGTATTGATTGGTTTCAGCTG  
GTACCGGTGAAATGCGGAAACGTTATGCTTTATTTATGTAGATAAAGATGATAATGGGAAGGGAAGTTATAATC  
GTTCCCGGAAAAATCTTTTGGCTGGTATAAGGAAGTTATTTTCATCTAACCGTGAATCAGTAGAATAG

50 4154.2  
ATGGATCAACAAAAACGGGTTGTTTGGTTTTCTGAAAACCATGTTATGGGACCAATGGGCAAACTTGCTCAGTTTA  
AAGTAGTACGTGCTATCACGGCTGCAGGTATGGCTGCTGTACCATTTACTATTGTAGGATCAATGTTTTTGGTATT  
CAGTATTTTGGCACAAGCTTTCTCATTTTGGCCAAATTTGGCAGATATTTCTCTGCTTCATTTGATAAAATTCACAT  
CACTTTACATGGTTGCAAACTATGCGACTATGGGTTCTCTATCTTTATTTGCTTCTATCACTTGATATGAATTG  
55 ACAAAAAATTTATGCAGAGGAAGAAGAACTCAATATGAATCCTCTTAATGGTGCTTGGCTTGCCTTGATGGCTTTG  
TCATGACAGTACCGCAAAATCATTTTGTGGTGGAAATGATGAAGACTGTGACAAAGTCTAAAAAGAAGGTGCAGTAA  
TTGCAGATGGATGGGCAATGGGAAATGTAGTCGCACGTTTTGGGACAAACAGGGATTTTTACCGCAATCATTATGG  
CAATTGTGACTGTTCTTATTTATCGTATGTGTGTTAAACATAAATGGGTTATTAAAAATGCCTGAAGCTGTTCCAGAA  
GGAGTTTCTCGTGGATTTACCGCTTTGGTTCCGGGATTTGTTGTCATTTGTTGTTATCTTTATCAACGGTCTTCTT  
60 GTAGCAATGGGAACAGATATTTTAAAGTCATTGCAATTCCATTGGTTTTGTATCCAACTGACTAATCTGTGGA  
TTGGTTAATGATTATTTATCTATTGACTCAACTACTTTGGATTGTAGGTATCCACGGTGCGAACATTGTTTTGCA  
TTTGTTAGTCCAAATGCTCTTGCTAACATGGCTGAAAAATGCTGCTGGCGGGCACTTGGCTGTTGCAGGTGAATTT  
CTAATATGTTTGTAAATGCAGGTGTTCTGGTGCAACTTTAGGACTATGTTTATATATTGCTTTGGCTCTAAATCT  
GAACAGCTTAAAGCAATAGGACGAGCATCTGTAGTCCAGCCTTATTTAATATTAATGAACCATTAAATTTTGGAT  
75 TACCTATTATCTATAATCCAGCCTTGGCTATACCATTTATTTAGCACCAATGGTTACTGCTACTATTTTACGTA  
GCGAATTTCTCTAACTTTATTAAGCCAATTATCGCACAGGTTCCATGGCCAACTCCAGTAGGGATTGGAGCTTCT

TAGGGACAGCAGATCTTCGAGCTGTATTAGTTGCTCTAGTATGTGCATTTGCAGCAATTCCTAGTCTATCTTCCATTC  
ATCCGTGTATATGATCAAAAATTGGTGAAAGAAGAGCAAGGTATCTAA

4155.1

5 ATGAAAAAATTTTATGTAAGTCCAATTTTCTATTCTAGTAGGATTGATTGCGTTTGGAGTCTTATCCACTTTTCAT  
TATTTTTGTTAATAAATCTGTTGACGGTTTTAATTTGTTTCTTTTGTAGGAGGCTATGTTTTTTATTTAAGAA  
ACTGAGAGTGCATTATACAAGGAGTGATGTAGAACAGATACAGTATGTAAACCACCAAGCGGAAGAAAGTTTGAC  
AGCTCTATTGGAACAGATGCCTGTAGGTGTTATGAAATTTGAAATTTATCTTCTGGAGAGGTTGAGTGGTTAATCCC  
10 TATGCTGAATTTGATTTTGACCAAGGAAGATGGTGATTTTGGATTTAGAAAGCTGTTCAAACGATTATCAAGGCTTCAG  
TAGGAAATCCGTCTACTTATGCCAAGCTTGGTGAGAAGCGTTATGCTGTTTATGATGGATGCTTCTCCGGTGT  
GTATTTTGTAGATGTATCCAGGGAACAAGCCATAACAGATGAATTTGGTAACAAGTAGACCAAGTATGGGATTGT  
CTCTGTGGATAATTATGATGATTTGGAGGATGAACTTCTGAGTCAGATATTAGTCAAATCAATAGTTTGTAGCT  
AATTTTATATCAGAGTTTTCAGAAAAACACATGATGTTTTCTCGTCCGGTAAGTATGGATCGATTTTATCTATTTAC  
15 TGACTACACGGTGCTTGAGGGCTTGATGAATGATAAATTTCTGTTATGATGCTTTCAGAGAAGAGTCGAAACAG  
AGCAGTTGCCCCCTTGACCTTAAGTATGGGATTTTCTTATGGCGATGGAAATCATGATGAGATAGGGAAGTTGCTT  
TGCTCAATTTGAACTTGGCTGAAAGTACGTGGTGCGACCAAGGTGGTTGTTAAGGAAAAACGCAAAACGAAAAATC  
CAGTTTATTTTGGTGGTGGTCTGCTGCTTCAATCAAGCGTACACGGACTCGTACGCGCGCTATGATGACAGCTAT  
TTCAGATAAAGATTCCGAGTGTAGATCAGGTTTTTGTAGTCCGTCACAAAAATTTAGACATGGATGCTTTGGGCTCT  
20 GCTGTAGGTATGCAAGTTGTTCCGACGCAATGTGATTGAAAAATAGCTATGCTCTTATGATGAAGAACAAATGTCTC  
CAGATATTGAACGAGCTGTTTCATTATAGAAAAAAGAAAGGAGTTACGAAGTTGTTGTCTGTTAAGGATGCAATGG  
GGATGGTGACCAATCGTTCTTTGTTGATTCTGTAGACCAATCAAAGACAGCCTTAACATTATCAAAAGAAATTTTA  
TGATTTATTTACCAAACCAATGTTATTGACCACCATAGAAGGGATCAGGATTTCCAGATAATGCGGTTATTA  
25 TATATCGAAAGTGGTGCAAGTAGTGCCAGTGAGTTGGTAACGGAATTTGATTCAAGTTCCAGAAATTTCAAGAAAAAT  
CGTTTGAGTGGTATGCAAGCAAGTGTCTTGATGGCTGGTATGATGTTGGATACTAAAAATTTACCTCGCGAGTAA  
CTAGTCCGACATTTGATGTTGCTAGCTATCTCAGAACCGCGGGAAGTATAGTATTGCTATCCAGGAAATCGCTGC  
GACAGATTTGAAGAATATCGTGAGGTCAATGAACTTATTTACAGGGGCGTAAATAGGTTGAGATGTAATA  
30 GAGAGGCTAAGGACATGAAATGCTATGATACAGTTGTTATTAGTAAGGCAGCAGATGCCATGTTAGCCATGCA  
GGTATTGAAGCGAGTTTGTCTTGCGAAGAATACACAAGGATTTATCTCTATCTCAGCTCGAAGTCGTAGTAAAC  
TGAATGTACAACGGATTATGGAAGAGTTAGGCGGTGGAGGCCACTTAAATTTGGCAGCAGCTCAAAATTAAGATG  
30 TAACCTTGTGAGAAGCAGGTGAAAACTGACAGAAATTTGATTAATGAAATGAAGGAAAAAGGAGAAAGAA  
TGA

4156.1

35 ATGAAAGAGAAAAATATGTGAAAGAAATGTTGAATCGTGACGGCTGGATTTGGTCTTTTTACTTGCCGTCCTTT  
TATATCAGGTTCCCTAGTGGTTACCTCTATTTGACTTTAAAAGAGTAGCCCTGCTACAGTCAGGCTGATAGT  
TGCTGGCCTTTCAATTTGTTGTTCTGGCTCTATTTATTATGGGAGCTCGTAAAACCAAGTTAGCTAGTTTAAATTTT  
CTTTTTTTAGAGCTAAAGATTTGGCAGCTTTGGGCTTGAGTTATCTAGTTATTGTCGGGTCAAATATACCTTGGTTCC  
ATTTTATTGCAACTGTCAAATGAGACGACAACAGCTAACCAAGTCTCAGATTAATGATATGGTTCAAATAGTTCGT  
40 TGATTTCCAGTTTCTTCTGCTAGCCTTGCTTGCTCCGATTTGTGAGGAAATCTTGTCGTGGGATTGTTCTCTAAA  
AAGATTTCCGAGGCAAGGAGAACTTGGGATTTGATGTCGGTACGATTGTGTTTGGCTTTATGCAATCAACCAAGTA  
ATTTACCTTCTTTATGATTTATGGAGGTATGTCGACAGTTCTATCTTGGACAGCCTACAAGACCCAACGTTTGG  
AATGTCGATCTTGCTTACATGATTGTTAATGGGATTGCTTCTGTTTGTGGCTCTTGTGGTATTATGAGTCGGA  
CATTAGGAATTTCTGTTAAATGAAAGAGAAAAATATGTGGAAGAAATGTTGAATCGTCAGGCTGGATTTGGT  
45 CTTTTTACTTGCCGCTCTTTATATCAGGTTCCCTAGTGGTTACCTCTATTTTGACTTTAAAAGAAAGTAGCCCTGC  
TACAGTCAGGCTGATAGTTGCTGGCCTTTCAATTTGTTGTTCTGGCTCTATTTATTATGGGAGCTCGTAAAACCA  
GTTAGCTAGTTTAAATTTTCTTTTTTAGAGCTAAAGATTGGCAAGTTGGGCTTGAGTTATCTAGTTATTGTCG  
GGTCAAAATATACTTGGTTCCATTTATTGCAACTGTCAAATGAGACGACAACAGCTAACCAAGTCTCAGATTAATGA  
50 TATGGTTCAAAATAGTTGTTGATTTCAGTTTCTTCTGCTAGCCTTGGCTGCTCCGATTTGTGAGGAAATCTGT  
GTCGTGGGATTGTTTCTAAAAAGATTTCCGAGGCAAGGAGAACTTGGGATTTGTAGTCGGTACGATTGTGTTTGC  
TTTATTGATCAACCAAGTAATTTACCTTCTTTATGATTTATGGAGGTATGTGACAGTTCTATCTTGGACAGCCT  
ACAAGACCCAACGTTTGGAAATGTCGATCTTGCTTACATGATTGTTAATGGGATTGCTTCTGTTTGTGGCTCTT  
GTGGTGATTATGAGTCGGACATTAGGAATTTCTGTTAA

4156.4

55 ATGGATACAAAAAGATTGAAGCGGCTGTAAAAATGATTATCGAGGCTGTAGGAGAGGACGCTAATCGCGAGGGC  
TTGCAGGAAACACCTGCTCGTGTAGCCCGTATGTATCAAGAGATTTTTTCAAGTCTTGGTCAAACAGCAGAGGAAC  
ATTTGTCAAATCCTTTGAAATTTATGACGATAATATGGTGGTAGAAAAGGATATCTTTTTCCATACCATGTTGTGA  
ACACCACTTCTTGCCATTTTATGGTAGAGCGCACATTGCCATTCAGATGGTGGTGGCAGGCTTGTCTAAG  
60 CTAGCCCGTACGGTTGAAGTTTATTCGAAAAAACCAAAATTCAGAAAGCTTTGAATATCGAAGTGGCCGATGCC  
TTGATGGACTATCTAGGTGCTAAAGGAGCCTTGTGTGTCATTGAGGCGGAACATATGTGTATGAGTATGCGTGGTG  
TTAGAAAAACGCACTGCAACCTTGACGACAGTAGCTCGTGGTCTATTTGAAACAGATAAGGATCTCCGTGACC  
AAGCTTATCGTTAATGGGGCTATAA

4157.2

5 ATGAAAGACTTGTCTTTAAAGAGAAAGCAGGCCCTTCGTAAGGAGTGTCTTGGTTATCTGCGCTATGTGCTCAATG  
ACCACTTTGTCTTGTCTGCTTGTCTGTTGGGCTTTCTAGCCTACCACTACAGTCAACTCTTACAACATTTTCTCT  
GAAAATCATTGGCCTATCCTTTTGTGTAGGAATTACGTCTGTTTACTTTTACTTTGGGGAGGAACTGCCACCTA  
TATGGAGGCTCCAGACAAGCTCTTTCTCTTAGTTGGAGAAGAGGAAATTAAAGCTCCATCTCAAGCGTCAAACTGG  
CATTCCCTAGTCTTTTGGCTCTTTGTACAGACCCTTTCTTGTCTGTTATTTGCGCCTTTATTTTACCAATGGGTTA  
TGGCTTGGCAGTTTCTGCTCTATGTGCTTTTATTTGGGGGTAGGAAAAATTTTCCACTTTTGTCAAAAGGCCAGCA  
AATTTTCTCACTGAAACTGGACTGGACTGGGACTATGTTATTTCTCAAGAAAGCAAGCGTAAGCAAGTCTTGCTTCG  
TTTCTTTGCCCTCTTTACGCAGGTCAAGGGAATTTCAAAACAGCGTTAAGCGTCTGCTATCTGGACTTTATTTTAA  
AGGCTGTTCAAGAGGTGCTGGGAAGATTTGGCAAAATCTCTATCTGCGTCTTATCTGCGAAATGGCGACCTCTT  
10 TGCTCTCAGTCTTCGTCTTCTCTTGTCTTCTTGTCTGGCGCAGGTTTTATCGAGCAAGCTTGGATTGCGACAGCAG  
TGGTAGTTCTCTTAACTACCTCTTGTCTTCCAGTTGTCTGGCCCTCTATCATGCTTTGACTACCAAGTATTTGACC  
CAACTTTCCGCTGGACAAGGGGCAAAAGGAAAAAGGCTTACAGGAGGTAGTTGAGGATTGACCAGTTTGTGTT  
TTACTTTGGAAATTAGTTGTTGGGTTGATTACCTTCCAAGAAAACTAGCCCTTCTAGCCTTACTAGGAGCTGGTT  
15 TGGTTTTACTAGTCTTGTATTTGCCTTATCAGGTAACGTCAGATGCAGGACTAA

## 4158.1

ATGAGAAAAATCAATAGTATTAGCGGCAGATAATGCCTATCTTATTCCTTTAGAGACGACTATAAAGTCTGTATTGT  
ATCACAATAGAGATGTTGATTTTTATATTCTCAACAGTGATATAGCTCCTGAATGGTTTAAATTTATTTGGGGAGAAA  
AATGGAAGTTGTGAATCTACAATTCGCACTGTACACATTGATAAAGAACTTTTGAAGCTATAAAACAGGACCT  
20 CATATAAATTATGCTTCTTACTTTAGATTTTTTGGCAGCAGAAAGTGGTTGAATCTGATAGGGTATTGTATCTGGATT  
CGATATCATTGTAACCTGGGGAAGTACTTTTGTGAGATAGATCTCAAAGGATATTCAATTTGGTGTGTTGAT  
GATGCTATGCCTATGAAGGACGAAAATCTGGATTTAATACTGGTATGTTACTAATGGATGTTGCAAAAGTGGAAAG  
AACATTTCTATTGTCAATAGTTTATTGGAATTAGCGGCCGAGCAGAAATCAAGTTGTTCACTTTGGGGATCAGAGTAT  
TTTAAATATTTATTTTGGAGTAAATTTGGCTAGCCTTAGATAAAACATATAATTATATGGTGGGTATTGATTTTATC  
25 ACCTTGCTCAAGAAATGTGAACGTCTAGATGACAATCCACCTACAATTGTTCACTATGCTAGTCATGATAAACCTTG  
GAATACATAGTATATCTAGACTACGTGAATATGCTGGGTTTATAGAGATTGGATTGGTCAGAGATTGCTTTT  
CAACGTTCCGATTTAAATTTTGAAGAAGCAATCAGTCTAAAAACAAGTGATGCTTGTGACATGGAGTGCA  
GATATAAAACATTTAGAGTATTTAGTACAACGGTTACCTGATTGGCATTTCATTTGGCTGCACCGTGTGATTGTC  
30 TGAGGAGCTGACCTCTCTATCACAGTATACGAATGTAAACAGTATATCAAAATGTATTACATAGTAGAATTGATTGG  
CTATTGGACGATTCTATAGTTTATTTAGATATTAATACAGGTGGAGAGGTTTTTAATGTAGTTACAAGGGCACAA  
AAAGTGGCAAGAAATCTTCGCTTTTGATATCACACGTAAGATGATGGATGATGGACTCTATGACGGTATTTTTTC  
TGTGGAGAGACCAGATGATTTAGTGGATAGAATGAAGAATATAGAGATAGAGTAA

## 4158.2

35 ATGACTAAGATTTATTCGTCAATAGCAGTAAAAAAGGACTATTTACCTCATTTCTACTGTTTATCTATGTATTGG  
GAAGTCGTATTATCTCCCTTTTGTGACCTAAATACTAAAGATTTTTAGGAGGTTCAACAGCCTATCTAGCCTTC  
TCAGCCGCCCTAACAGGTGGGAATCTAAGAAGTTTATCAATTTTTCTGTTGGATTATCCCTTGGATGTCCGCCA  
TGATTTTATGGCAGATGTTTCTTTTCTAAACGGTTGGGTTAACATCTACGTCTATAGAAATACAAGATCGCCGT  
40 AAAATGTACCTGACCTTGCTAATTGCTGTGATCAATCCTTGGCAGTTAGCTTGAGACTGCCAGTACAATCCTCT  
ATTCTGCAATTTGGTTGTTCTAATGAATACAATTTGCTGATAGCAGGAACATTTTTCTGTTGGTTGTCAGAT  
TTAAATGCGAGTATGGGGATTGGAGGTTCTATTGTAATCCTCTATCCAGTATGGTTTTAAATATTCCTCAGGATG  
TTTTGAAACATTTACAGACAGTACACATTTCAACAGGGATTATGTGTTACTTGTCTTATTAACCTTGTCTTTCT  
TATTTACTTGGCCTTATGTATCGAGCTCGCTATTTGGTTCCTGTTAATAAAATTTGGCTTACACAATCGATTTAAAG  
45 CTATTCTTATCTCGAAATCATGTTGAAATCCTGCAAGTGGGATGCTTATATGTATGTGATGATTTTCTTGTGAC  
CAGCTTATTTGTTTCTGTTGGGATTTATTTCCCTAATCATTAGGTTAGCGGCTTATCAAGGAATTTATG  
GTTGGAAAGCCTTTGTGGGTCTATGTTTATATTTCCGCTTATTTTATTTAGTATCATTTTTGCTTTGTTACGATG  
AATGGAGAAGAGATTGACAGCCGTATGAAAAATCTGGAGAATACATTTATGGTATTTATCCAGGTGCGGATACT  
AGTCGATTTATTAATCGATTGGTCCTTCGTTTCTCAGTCATAGGTGGTCTCTTAAATGTGATTATGGCAGGTGGTCC  
50 CATGCTTTTTGTTTTGTTGATGAAAGTTATTACGATTGGCAATGATTCCAGGCTTATTTATGATGTTCCGGGGGCA  
TGATTTTACGATTAGAGACGAGGTCAAGGCTTAAAGCTAAATGAGACCTATAGACCTTTGATTTAG

## 4158.3

ATGTCCTCTCTTTCGGATCAAGAAATTAGTAGCTAAAAACAGTAGAGTTTCGTGAGCGTCTTTCCGAGGGAGAAAGTC  
TAGACGATATTTTGGTTGAAGCTTTTGTCTGTGGTGGTGAAGCAGATAAGCGGATTTTAGGGATGTTTCTTTATGA  
55 TGTTCAAGTCATGGGAGCTATTGTCATGCACTATGGAATGTGCTGAGATGAATACGGGGGAAGGTAAGACCTT  
GACAGCTACCATGCCTGTCTATTTGAACGCTTTTTCAGGAGAAGGAGTGATGGTTGTGACTCCTAATGAGTATTTA  
TCAAAGCGTGATGCCGAGGAAATGGGTCAAGTTTATCGTTTCTAGGATTGACCATTTGGTATCCGAAAG  
ATCCAAAGAAGGAGATGAAAGCTGAAGAAAAAGAGCTTATCTATGCTTCGGATATCATCTACACAACCAATAGTA  
60 ATTTAGGTTTTGATTATCTAAATGATAACCTAGCCTCGAATGAAGAAGGTAAGTTTTACGACCGTTTAACTATGT  
GATTATTGATGAAATGATGATATCTTGTGATAGTGACAAAACTCCTCTGATTATTGGCGGTTCTCTCGTGTTC  
AGTCTAATTACTATGCGATCTTGTATACACTTGAACAACTTGGTGAAGGAGAGGATTATATCTTTAAAGAGGA  
GAAAGAGGAGGTTTGGCTCACTACTAAGGGGGCAAGTCTGCTGAGAAATTTCTAGGGATTGATAATTTATACAA  
GGAAGAGCATGCGTCTTTTGTCTGCTATTGTTTATGCGATTGAGCTCATAAGCTCTTACTAAAGATAAGGAC  
TATATCATTGGAATGAGATGGTGTGATAAGGGAACAGGGCGTCTAATGGAAATGACTAAACTTCAA  
65 GGAGGTCTCCATCAGGCTATTGAAGCCAAGGAACATGTCAAATTATCTCTGAGACGCGGGCTATGGCCTCGATC

ACCTATCAGAGTCTTTTAAGATGTTTAAATAAGATATCTGGTATGACAGGGACAGGTAAGGTGCGGAAAAAGAG  
 TTTATTGAAACTTACAATATGTCTGTAGTACGCAATCCAAACCAATCGTCCGAGACAACGGA  
 TTGACTATCCAGATAATCTATATCACTTTACCTGAAAAAGTGTATGCATCCTTGGAGTACATCAAGCAATACCA  
 5 TGCTAAGGGAAATCCTTTACTCGTTTTGTAGGCTCAGTTGAAATGTCTCAACTCTATTCTGCTCTCTTGTTCGTG  
 AAGGGATTGCCATAATGTCTAAATGCTAATAATGCGGCGCGTGAGGCTCAGATTATCTCCGAGTCAGGTCAGA  
 TGGGGGCTGTGACAGTGGCTACCTCTATGGCAGGACGTGGTACGGATATCAAGCTTGGTAAAGGAGTCGCAGAGC  
 TTGGGGGCTTGATTGTTATTGGGACTGAGCGGATGGAAGTACAGCGATCGACCTACAAATTCGTGGCGCTTCTGG  
 TCGTCAGGGAGATCCTGGTATGAGTAAATTTTTGTATCCTTAGAGGATGATGTTATCAAGAAATTTGGTCCATCT  
 10 TGGGTGCATAAAAAAGTACAAAGACTATCAGGTTCAAGATATGACTCAACCGGAAGTATTGAAAGGCTGATAATAC  
 CGGAAACTAGTCGAAAAGGCTCAGCATGCCAGTGATAGTCTGGACGTTCAAGCAGTCGTGAGACTCTGGAGTAT  
 GCTGAAAGTATGAATATACAACGGGATATAGTCTATAAAGAGAGAAATCGTCTAATAGATGTTTCTCGTGACTTA  
 GAGGATGTTGTTGTGGATATCATTGAGAGATATACAGAAGAGGTAGCGGCTGATCACTATGCTAGTCGTGAATTAT  
 TGTTCACCTTTATTGTGACCAATATTAGTTTTCATGTTAAAGAGGTTCCAGATTATATAGATGTAAGTGACAAAAC  
 15 GCAGTTCTGAGCTTTATGAAGCAGGTGATTGATAAGAACTTTCTGAAAAGAAAGAACTTAACTTAATCAACATGACT  
 TATATGAACAGTTTTACGACTTTTCACTGCTTAAAGCCATTGATGACAACTGGGTAGAGCAGGTAGACTATCTACA  
 ACAGCTATCCATGGCTATCGGTGGTCAATCTGCTAGTACGAGAAATCCAACTCGTAGAGTACTATCAAGAAAGCTA  
 CGCGGGCTTTGAAGCTATGAAAGAACAGATTATGCGGATATGGTGCCTAATCTCTGATGGGGCTGTTGAGGT  
 CACTCCAAAAGGTGAAATCGTGAATCTTTCCATAA  
 20 4158.4  
 ATGATAGGGACTTTGCGCGCTGCTCTTGTAGCTGTACTAGCAAATTTTCATCGTCCCTATTGAAATTACCCCAATA  
 GTGCCAATCTGAAATTCACCAACAGATGGGATTGGGCAGGTTCTCAGCAACCTCTTGCTCAAACTGGTTGACA  
 ACCCAGTCAACGCCCTGCTTACTGCTAACTATATTAGAATCTTATCTTGGGCACTCATTTTTGGAATCGCTATGAG  
 25 AGAAGCCAGTAAAAATAGTCAAGAATTGCTAAAACTATCGCTGACGTGACTTCTAAAAATTGCGAATGGATCAT  
 CAATCTGGCTCCATTTGGAATCCTTGGTCTTGTGTTTTAAACCATTCTGACAAGGGAGTCGGAAGCCTTGCCAAC  
 TACGGTATTTTATTGGTTCTATTAGTAACGACTATGCTTTTTGTTGCCCCCTGTGGTCAACCCCTTGATTGCTTCTTC  
 TTTATGAGACGCAATCCTTACCCCTCTAGTTTGGAACTGCCTCCGTGTGACAGCGTGTGACAGCCTTTTCACTCGTA  
 GTTCTGCGACTAACATTCCTGTCAACATGAACTCTGCCATGACCTTGGACTCAACCCAGATACCTATTCTGTTTC  
 30 TATCCCACTCGGTTCTACTATCAATATGGCTGGAGTAGCGATTACCATTAACTTTTGACCCCTTGCTGCAGTTAAC  
 ACTCTTGGAAATTCCTGTTGACTTTGCCACAGCCTTTGTCTCAGTGTGGTAGCAGCTATCTCATCTGTGATGCTTC  
 AGGTATTGCCGAGGTTCCCTCCTTCTATCCAGTGTCTGTAGCCTTTTCGGTATTCTAACGATATTGCCATAC  
 AAATTGTTGGGGTTGGTTTTGTGATTGGTGTCTCAAGACTCATGTGAAACAGCCCTTAACCTCTTACAGATGT  
 CCTCTTACCGCCGTTGCCGAATACGCAGCAACCCGTAAAAAATAA  
 35 4158.5  
 ATGCTATTAGCCAACGTACGACCAAGCTCATCTTAGCTACCTGTCTTGCCCTGCCTGCTTATTTTCTCAATCT  
 TTCGTGAGCAGTTTCGGCTGGAATTATCGCTCTCTTGAGCCTATCTGATACGCGTAGAAGTACTTTAAACTGGCT  
 CGCAATCGTCTTTTTCTATGCTTCTAGCTCTGGCTATCGGTGTTCTAGCTTTTCACTTGAGCGGATTTCATATCTG  
 40 GAGTCTCGGCCCTCTATCTGGCCTTCTACGTTCTTTAGCTCAAGATGGGCTGGGAAATTTGGCATCACACCAAGC  
 ACTGTTTTGTTAGCCATCTTGGTTCAAGACTCAACCTCTCAGACCTTCTAGTCAATGAATTCCTTCTCTTTG  
 TATTGGTACAGGATTGCTTGTGTTAATCTCTATATGCTTCAAGAGAGAGGAAATCCAGCACTACCACAG  
 CTGGTGGAAAGAAAGTTAAAGATATCCTCCAGCGCTTCAAACTACTATTATCCAGAGGAGACGGACGCAACCGA  
 GCACAGCTGGTAGCAGAATTAGACAGCCTTTGAAAGAGCCCTCAGACTGGTCTATTTGGATCACTCTGACCAAC  
 45 TCTTTCAACAGACAGACTACCATATCCACTACTTTGAGATGAGACAGCGACAAAGTCGTATCCTGAGAAACATGG  
 CCCAACAGATTAACTTGTACCTTGCAGCAGTGAAGCCTGATCTTAGCGCAACTCTTTCAAAAAATTGACAG  
 TCAACTGAGCCAGACCAATCCTGCTTCTGATTGTAGATGAAATTGAACGTTATCTGGAAGTCTTCGGAACCCG  
 AGTCTGCCCAAGACAAGAGAAGAAATTGAAACCCGCGCCACCTTCTTCACTCTACGTGAAGCCAAACCTTC  
 ATCCAAGTAAAGTTGATTTTTACAAAAATATAGACAGTAA  
 50 4158.6  
 ATGGAAATCATGTCGCTTGGGATTGCTGTTTTGCGGTCATCATTTGGTTTGTGATTTGGATATGTCAGCATCTCAGC  
 TAAGATGAAATCATCTCAGGAAGCTGCAGAGTTGATGCTTTTAAATGCTGAACAAGAAGCAACTAATTTACGTGG  
 ACAAGCTGAGCGTGAAGCGGATTTACTTGTAAATGAAGCCAAACGTTGAAAGCAAGTCTCTTAAAAAAGAAGCACT  
 55 ATTGGAGGCCAAAGAAGAAGCCAGAAAAATACCGTGAAGAAGTGGACGCTGAATTTCAAACTCAGAACGTCAGAAGC  
 TCAAAACAAATCGAAAGTCGTTTGACAGAGAGAGCTACTAGCCTTGACCGTAAGGACGACAATTTGACGAGTAAAG  
 AACAAACACTTGAACAAAAAGAACAAAGTATTTCTGATAGAGCGAAAAACCTTGATGCGCGTGAAGAGCAATTAG  
 AGGAAGTCGAAAGACAAAAAGAGCAGAACTAGAGCGTATTGGTGGCTGTCTCAGGCAGAAAGCACGAGATATT  
 ATCTTGGCTCAGACAGAGGAAAACTTGACCAGGGAGATTGCCAGTGCATTGCGGAAGCTGAGCAAGAGGTCAAG  
 60 GAACGTTCTGACAAAAATGGCCAAAGGACATCTTGGTTCAAGCTATGCAACGATATCGCTGGTGAATATGTAGCGGAG  
 TCAACAAACTCAACAGTTTCTGCCCAGAGATACTATGAAGGGACGCAATTATTGGTCTGAAAGGTGTAACATT  
 CGTACCTTTGAAAGTTTGACAGGGGTGATGATTATCGACGATACACCAGAAAGTGGTGGTGTGACAGATTG  
 ATCCGATTGCTGCTGAGATTGCCCGTATGACTATGGAATGTTGCTCAAGATGGTCTATACATCCAGCTCGTAT  
 CGAAGAGTTGGTTGAGAAAAACCGTCAAGAGATTGACAAATGAAGTTCGTGAATACGGTGAGGCTGCTGCTATGA  
 65 AATTGGTGCCGCAACCTTATCCAGACTTGATGAAGATTATGGGACGTTTGCAGTTCCGTACTTATATGGACAA  
 AATGTTTTGCCCATTCGATTGAGGTTGCTAAGTTGGCTGGTATCATGGCGAGCGAACTTGGTGAAGATGCGGCTC

TTGCCCGTCGTGCTGGATTCTTCACGATATCGGGAAGCCATTGACCATGAGGTTGAAGGTAGCCACGTTGAAAT  
CGGTATGGAAATGGCCCGTAAGTACAAGGAACCCCAAGTTGTGGTGAATACGATTGCTAGTACCACGGAGATGT  
TGAAGCTGAGAGCGTGATAGCAGTTATCGTCGTCGAGCAGATGCCCTTGAGCGCAGCCCGTCCAGGTGCTCGTAG  
5 TGAGTCTCTTGAAGCTACATCAAGCGTCTCCATGATTTGGAAGAAATTGCTAACGGCTTTGAAGGAGTGCAAAT  
AGCTTTGCCCTTCAAGCAGGACGTGAAATTCGTATCATGGTCAATCCAGGAAAAATCAAGGACGACAAAGTCACA  
ATCTTGGCTCACAAAGTTCGTAAGAAAAATTGAAAACAATCTCGATTATCCAGGAAATATCAAGGTAAACCGTGATT  
CGCGAGCTTCGTGCAGTAGATTATGCTAAATAA

4158.7  
10 ATGATGTTAAAAACCTCTATTGATACCTTGCTCGACAAGGTTCTCTCAAAATATTCACCTCGTAATCTTGAAGCAA  
AACGTGCCACGAATTGGAAGCAGGTGCCCAAGCAACTCAAGTTTCAAGTCTGAAAAATCAACTCTTCGCGCTT  
TAGAAGAAATCGAATCAGGAAACGTTACAATTCACCCAGATCCAGAAGGAAAAACGTGAAGCAGTGGTGGCGCTA  
TCGAAGAAAGAAAAACGCCGCAAGGAAGAAAGAAAAAGAAAAATCAAGAGCAAAATGCTAAAGAAAAAGAAGA  
15 TGGTAAAAAAATTTAA

4161.1  
ATGTCAGCATATCAATTACCGACCGTATGGCAGGATGAAGCTAGTAATCAAGGAGCTTTTACGGGGCTAAACAGA  
CCAAACAGCAGGTGCCCGTTTCGAACAAAACTTGCCAAAAGGAGAACAAGCTTTTACGCTTTATTCAGTGGGAACA  
20 CCAAAATGGTGTGAAGGTTACTATCTTATTGGAAGAAATTAAGAGCTGGTTTAAAGGAAGCGGCTTACGACTTGT  
ATAAGATTGCTATCATGGATGGGGATCAATTCCGATCAGACTTTGTGAAGCTCAATCCAAATTCGAAGATTCCAGC  
CTTATTGGACCACTCAGGTACTGAAAACTGAAGAGTCTTGAAGTCTGCTCATATTCTTCTTACCTTGCTGAGAAA  
TTTGGAGCCTTTTACCAAGTAATCCTGTGGAAGGAGTGAAGTTTGAATTGGCTATTCTGGCAAGCAGGTGCAG  
CACCTTTTCTAGGTGGGGATTTGGACATTTCTCAATTATGCTCCTGAAAAATTTGAATATCTTATTAACCGTTT  
25 ACGATGGAAGTGAACGCCAGTTGGATTATTTGGATAAGGAATTGGCTCAGAAACCTTATATTGAGGCAATGAC  
TATACGATTGCAGATATTGCTATCTGGTCTTGGTATGGACAGTTAGTTCAAGGAAATCTTTACCAAGGTTCTGCAA  
AATTCCTGGATGCTCAAGTTATCAAAATCTAGTAAAAATGGGCAGAAAAATTTGCCAATCGTCCAGCTGTTAAGC  
GTGGCTTGAAGTAACCTTATACAGAAATTAATAG

4161.2  
30 TTGGCAAGCTTGATCACTTCTATCATCATGTTCTATGTCGGTTTCGATGTTCTAAGAGATACCAATCAAAAGATTCT  
CAGTCGGGAAGAAACGGTCATTGATCCTCTTGGTGCACTCTAGGAATCAATTCGACGCGATTATGTTTGTGGTC  
TATCTCTACAATACTCGCCTCAGTAAGAAATCCAATCCAATGCGCTGAAGGCAGCTGCTAAGGACAATCTTTCTG  
ACGCTGTTACCTCACTTGAACCGCCATTGCCATCCTAGCTAGTAGTTTCAATTATCCGATTGTGGATAAACTGGT  
35 TGCTATCATCATCACTTTCTTATCTTGAAGACTGGCTATGATATCTTCATCGAGTCTTCTTTAGTCTTTCAGATG  
GCTTTGACGACCGCTGCTCGAGGACTACCAAAAGGCTATCATGGAATTTCCAAAATCAGCAAGGTCAAAATCGC  
AAAGAGGTGCGACCTACGGTAGCAACATCTACCTGGATATTACACTAGAGATGAATCCTGACTTGTCTGTTTTGA  
AAGCCATGAAATCGGGATCAGGTGAGTCTATGCTGGAGGAGCGTTTGGCGTCTTTGATACCGATGTCATATC  
GAACCAGCACCTATCCCTGAGGATGAAATTTTAGACAATGTCTATAAAAAATTTGCTTATGCGTGAACAATTGATTG  
40 ACCAAGGAAACCACTAGAAGAACTCTGACTGATGATTTTGTCTATATTCGCCAAGATGGAGAGCAGATGGATA  
AAGAGGCTTATAAGACCAAAAAAGAGTTAAATCTGCTATCAAGGACATTCAAATTACTTCCATCAGTCAAAAA  
CCAAACTCATCTGCTATGAGTTAGATGGTATCATCCATACCAGTATCTGGCGTCGCCACGAAACCTGGCAAAATAT  
CTTTCATCAAGAAACCAAAAAAGAATAG

4162.1  
45 ATGACAAATTAAGTATAGCAACGGATATGGACGGAACTTCTAGATGGGAATGGACGCTTTGATATGGATCGT  
CTCAAGTCTCTCTTGGTTTCTACAAGGAAAAAGGGATTTACTTTGCGGTAGCTTCGGGTGCGGGATTCTGTCTC  
TAGAAAAATTTTGTGTTGTTCTGATGACATTTTTCATCGCGGAAAAATGGCAGTTTGGTAGATATCAAGG  
TCAGGACTTGTATGAAGCGACTATGTCGCTGACTTTTATCTGGCAACTTTTGAAGAGCTGAAAACTTACCTTAT  
50 GTAGATATCAATAAACTGCTCTTGACGGGTAAGAAGGGTTTCAATGTTCTAGATACGGTTGATGAGACCTATTTGA  
AAGTGAGTCAGCACTATAATGAAAAATATCAAAAAAGTAGCGAGTTTGAAGATATCACAGATGACATTTTCAAA  
TTACAACCAACTTACAGAGAAGAAACGCTGGAAGATGGGAGGCTTGGGTAACGAAAAACGTTCTGGTGTAAAGG  
CCATGACAACTGGCTTTGAATCCATTGATTTGTTCTGGACTATGTCGATAAGGGAGTGGCCATTGTTGAATTAGT  
TAAAAAACTTGGTATCAATGATCAGGTGCTGCTTTTGGAGACAATCTTAACTGACTTACATATGATGCAGGT  
55 GTGGGACATCTGTAGTCTCTGAAAAATGCACGACCTGAAATTTAGAATTAGCAAGACTGTGATTGTCACCATA  
AGGAACGGTGGTTATAGCTTATATGGAGGGCTTATAA

4162.2  
ATGGCAGATATAAAATGATTGCATTGGACTTGGACGGGACCTTGGTGAATGATGATAAAAGGCTGACGGATCGT  
ACCAAGGAAACCTTGAAGCTGCGCGTATCGTGGTATCAAGGTCGTATTGACAACTGGTGGTCCCTTAAAGGCC  
60 ATGGATTTCTTTCTCATGAGTTAGGAGTACGGTCAGGAAGATGAGTATACCAATTAATTTAATGGTGGATTAG  
TTCAGAAAAATACAGGAGAAATCCTTGATAAAACAGTCTTTTCATATGATGATGTTGGCAGCTTTGATGAAGAAAC  
AGAGAAATTAACACTGCCTCTTGATGCCATCTCAGAAGGAACAGTTTATCAAAATCCAATCGGACCAAGAAAGTCT  
TTATGCCAAATTCATCCAGCTTTGACCTTTGTTCCAGTGGACTTTGAAGACTTATCTAGTCAAAATGACCTACAAC  
AAATGCGTGACTGCCTTTGCTCAAGAACCTTGGATGCAGCCATTGAGAAGATTCTCCAGAATTGTTTGACCAAT  
65 ATGAAATCTTTAAATCACGTGAAATGTTGCTAGAATGGTCACCAAGAAATGTTTCATAAAGCAACAGGTTTGGCAA



AACTAATCAGCCATCTTGAATCGACCAAAAGTCAAGTGATGGCTTGTGGTGACGAGGCCAATGACCTCTCTATGA  
TTGAATGGGCAGGTCTTGGTGTGCTATGCAAAACGCTGTTCTGAAGTAAAGGCAGCCGCAATGTAGTGACGC  
CGATGACCAACGATGAGGAAGCTGTGCGCTGGGCTATCGAAGAATATGTGCTAAAGGAGAACTAA

5 4164.2  
ATGGAAAGTTTACTTATTCTATTATTAATTGCCAATCTAGCTGGTCTCTTTCTGATTGGCAAAGGCAGGATAGGC  
AGGAGAAACACTTAAGTAAGAGCTTGGAGGATCAGGCAGATCATTTGTGACACCAGTTGGATTACCGCTTTGACC  
AAGCCAGACAAGCCAGCCAGTTAGACCAAAAAGATTGGAAAGTGGTTGTGACGACCGCTTTGCAAGAAAGTGGGA  
10 TTGAATTGCACCAAGGTCTGACCCAAGTCCGTCAAGAAATGACAGATAATCTCTCCAACTAGAGACAAGACAG  
ACCAACGTCTCCAAGCCTTGCAGGAATCAAATGAGCAACGTTTGGAAACAAATGCGCCAGACGGTCCGAGGAAAAAC  
TAGAAAAGACCTTGCAGACACGCTTACAGGCTTCTTTGAGACAGTTTCTAAACAACCTGGAGTCTGTCAATCGTGG  
CCTTGGAGAAATGCAGACAGTTGCCCGTGTGTGCGAGCTCTTAAACAAGTTCTCTCTGGAACCAAGACGCGAGG  
GATTCTGGGGAATTGCAACTGGGGCAAATTATTGAAGACATCATGACACCTGCCAGTACGAAATCAGTAACGC  
15 AACGGTTGAAAACCTCTAGTGAACGAGTGGAGTATGCCATCAAGTTACCCGGACAAGGCGACCAAGAATACGTCTA  
TCTGCCAATTGACTCTAAGTTTCCACTGGCAGATTATTACCGCTTGGAAAGAAGCCTATGAGACAGGTGACAAGGAT  
GAGATTGAACGCTGTGCTAAGTCACTCTAGCAAGCGTCAAGCGCTTGTAGGGATATTAGGAACAAGTACATA  
GCACCACCTCGGACGACCAATTTTGGAGTTTGTGTTTCCGACAGAAAGGTCTCTACTCAGAAATCGTCCGCAATC  
CGGTCTTCTTTGATGATTGAGACGGGAAGAACAGATTATTGTGACAGGACCAAGTACCCTATCAGCCCTTCTTAA  
CTCCCTATCAGTTGGTTTCAAGACCTTAATATCCAAAAGAGTGGCGACCATATCAGCAAGACTCTTGGCAGTGT  
20 AAGACCGAGTTTGGCAAGTTTGGTGGTATTCTGGTCAAGGCAAAAAACATCTCCAACATGCTCTGGCAATATTG  
ATGAATTATTAACCGTGTACCATAGCTATCGAGCGGACGCTCCGTACATTGAGTTGTGAGAAGGTGAGCCTGC  
GCTTGATCTACTCCATTTTCAAGAAAATGAGGAAGAATATGAAGATTAG

25 4164.3  
ATGAAGATTAGTCACATGAAAAAAGATGAGTTATTTGAAGGCTTTTACCTAATCAAATCAGCTGACCTGAGGCAA  
ACTCGAGCTGGGAAAAAATACCTAGCCTTTACCTTCCAGATGATAGTGGCGAGATTGATGGGAAGCTCTGGGAT  
GCCAACCTCATAACATTGAGGCTTTACCGCAGGTAAGGTTGTCCACATGAAAGGACGCGAGAAAGTTTATAAC  
AATACCCCTCAAGTCAATCAAATTACTCTCGCCTGCCTCAAGCTGGTGAACCAATGACCCAGTGATTTCAAGG  
30 TCAAGTCAACAGTTGATGTCAAGGAAATTCGTGACTACATGTCGCAAAATGATTTTCAAAATTTGAAAATCTGTCTG  
GCAACGGATTGTCCGAAATCTCTACACCAAGTATGATAAGGAATTTACTCCTATCCAGCTGCCAAGACCAACCA  
CCATGCCCTTTGAAACGGGCTTGGCTATCATACGGCGACCATGGTGGCTTTGGCAGACGCTATTAGCGAAAGTTTAT  
CCTCAGCTCAATAAGAGCCTGCTCTATGCGGGGATTATGTTGCATGACTTAGCTAAGGTATCGAGTTGACGGGGC  
CAGACCAGACAGAGTACACAGTGGCAGGTAATCTTCTTGGACATATCGCTCTATTGATAGCGAAATACCAAGA  
CAGTTATGGAACTCGGCATCGATGATACCAAGGAAGTGGTTTGGCTCGTCAATGCTATCCTCAGTCAACACCG  
35 CTGCTTGAGTATGGAAGCCAGTCCGTCCACGCATTATGGAAGCAGAGATTATCCATATGATTGACAATCTGGAT  
GCAAGCATGATGATGATGTCAACAGCTCTTGCTTTGGTGGATAAAGGAGAGATGACCAATAAAATCTTCGCTATG  
GATAATCGTTCCTTCTATAAACCAAGATTAGATTAA

40 4166.2  
ATGAGTGAAAAAGCTAAAAAAGGTTTAAAGATGCCTTCATCTTACACCGTATTATTGATAATCATTGCTATTATGG  
CAGTGCTAACTTGGTTTATCCCTGCGGGGGCTTTATAGAAGGTATTTACGAGACTCAGCCTCAAAATCCAAAGG  
GATTTGGGATGTCTCATGGCACCGATTCCGGCTATGCTAGGTACTCATCCAGAGGAAGGTTCCGCTATTAAAGAA  
ACGAGCGCAGCGATTGATGTAGCCTTCTTCATCTTATGGTTGGTGGTTTCTTGGCATTGTCAACAAAACTGGT  
45 CTCTTGACGTAGGGATTGCCTCTATCGTGAAGAAGTATAAGGGCCGCAAAAAATGTTAATTTTGGTACTGATGCC  
TTGTTTGGCCTCGGTGGTACAACCTATGGTATGGGTGAAGAAACAATGGCCTTCTATCCACTCTTGTGCCAGTT  
ATGATGGCCGTTGGTTTGTATAGCCTGACTGGTGTGCAATTATTTGTCTCGGTTCTCAAATCGGCTGTTTGGCATC  
TACTCTGAATCCATTGCGACAGGTATTGCTTCAGCGACTGCGGGAGTTGGTACAGGGGACGGTATCGTACTTCGT  
CTGATCTTCTGGGTTACCTTGACTGCTCTTAGTACTTGGTTGTTTACCCTTATGCGGATAAGATTCAAAAAGATCC  
50 GACTAAGTCACTGGTTTATAGTACTCGCAAGAAGATTGAAACACTTTAACGTAGAAGATCTTCATCTGTAGAA  
TCTACACTTAGCAGCAAAACAAAAATCAGTTCTCTTATTGTTGATGACATTCTCTGATGGTATTGAGCTTCAT  
TCCATGGACAGACCTTGGCCTTACCATTGATGACTTTAATACTTGGTTGACTGGTCTTCCAGTTATTGGTAATA  
TTGTGCGTTCTACTTCTGCACTAGGTACTTGGTACTTCCAGAAAGGCGCAATGCTCTTGGCTTTATGGGTATC  
CTGATTGGTGTATTATGGTCTTAAAGAAGATAAGATTATCTTCTTCATGAATGGTGTGCTGACTTGTCTCAG  
55 TGTGGCTTGATCGTAGCGATTGCTCGTGGTATTCAAGTTATCATGAACGACGGTATGATTACCGATACAATCCTC  
AAGTGGGTAAGAAGGCTTGGAGCGTCTATCTTCAAGTCTTATCGTTGTAACCTATATCTTCTATCTACCTAT  
GTCATTCTTGATCCCATCTTCATCTGGTCTTGGCAGCGCAACTATGGGTATCATGGC  
TCCACTTGGAGAAATTTGAAATGTCCGCTCCTAGCTTGATTATCACTGCTTACCAATCTGCTTCAGGTGTCTTGAAC  
TGATTGCACCAACATCTGGTATTGTGATGGGAGCTCTTGCACCTGGAGTATCAACATTGGTACTTGGTGGAAAT  
60 CATGGGCAAACTCGTAGTCGCTATTATTGTAGTGACCATCGCCCTTCTTCTGCTTGGAACTTCTTCCATTCTAT  
AA

65 4166.3  
ATGAAAATAGATATAACAAATCAAGTTAAAGATGAATTTCTTATATCATTAAAAACCTTGATTTCTATCCTTCAG  
TACTCAATGAAGGAGAAAAATGGAACACCTTTTGGACAAGCAATCCAAGATGTCTAGAAAAAATTTAGAGATT  
GTCGAGACATAGTTTCACTACCTATCTTGACCCTAAAGGTTATTACGGATATGCAGAAATCGGTACAGGGAGCAG

AGCTTCTGGCCATTCTCTGTCAATTGGATGTTGTTCCATCAGGTGATGAAGCAGATTGGCAGACACCGCCATTGGA  
 AGCAACTATCAAAGACGGCTGGGTATTCCGACGTGGTGTCCAAGATGATAAAGGCCCTTCGCTCGCAGCTCTCTA  
 TGCAGTAAAAAGCTTGCTGGACCAAGGTATTCAAGTTCAAAAAGCGGTACGCTTTATCTTTGGTACCGATGAGGA  
 AACCCTCTGGCGCTGCATGGCAGCTACAATACCATCGAAGAACAGGCCAGTATGGGCTTTGCACCTGACTCATC  
 5 TTTTCTCTGACCTATGCTGAAAAAGGGCTTCTACAGGTCAAACCTTCATGGCCCTGGATCGGATCAACTAGAGCTT  
 GAAGTAGGAGGGCGCTTTAACGTTGTACCAGACAAGGCCAACTACCAAGGTCTCCTCTATGAACAGGTTTGTAAAC  
 GGTCTCAAAGAAGCTGTTATGATTACCAAACCACTGAACAAACCGTAACGGTTCTCGGAGTGCCAAAGCATGCT  
 AAGGATGCTAGTCAAGGTATCAATGCTGTATCCGACTAGCTACCATTTCTGCTCCTCTCCAAGAACACCCGTCTC  
 10 TCAGTTTCTTGCAACACAAGCAGGTCAAGACGGCAGGAAGACAAATCTTTGGTGATATAGCAGATGAACCTT  
 CTGGTCACCTATCTTTAATGTGCGAGGTCTCATGATCAATCATGAACGTTCTGAAATCCGTATTGACATTTCGGAC  
 TCCTGTCTTAGTGACAAGGAAGAACTAGTAGAGTTGCTTACAAGATGTGCACAAACTACCAACTCCGCTACGA  
 AGAGTTTGAATCTAGCGCTCTATACGTGCGAGAAGACAGTAACTCGTTAGCACACTGATGCAAACTTACCA  
 AGAAAAGACTGGCGATAACAGTCTGCTATTTATCCGGTGTGCGCACTTTTGTCTGCACTTGCACCAATGCCAAATGTTGA  
 15 GCCTTCGGCGCTTATCCAGGAGCGAAGCAGACAGAACATCAGGCAATGAATGTGCGGTTCTAGAAGATTG  
 TACCGTCTATGGATATTTATGCCGAAGCCGTCTATCGACTTGCAACTTAA

4169.1

ATGTCTAATTCAATTGTCAAGTTGTTAGTCTCTCAATTATTTGCAAAATTTAGCAGATATTTCTTTAGAGTAACAAT  
 CATTGCTAACATATACATTATTTCAAATCAGTAATGGCCATCACTAGTTCCTATCTTAATAGGAATATCTCTT  
 20 TTGTTGCGAGTCTTTTAGTTCGGTTGGTTACTAAAAGGTTAGCGTAAATAGGGTTTATCTTTATCTCAATTGGGA  
 AAGACTATATTATTGGCGATACTGGTAGGAATGTTTACCGTAATGCAATCCGTAGCGCTTTGGTGACCTATCTAT  
 TTGTTGTTGCAATTTCCATACTAGATGGTTTTGACGACCCCGTTTCTATGCTATTGTGCGCACGCTATGCGACCGAT  
 TTGGGTAAAGCTAATTCAGCCTTATCAATGACTGGTGAAGCTGTTCAATTGATAGGTTGGGGATTAGGTGGACTCT  
 25 TGTTTGCAACAATTGGTCTGTTACCTACCAGTGTATCAATTTAGTCTTGTATATCATTTCTGATGTTTA  
 TTCTTCTTAACGCTGAAGTGGAGGTGTTAGAGTCAGAACTAATCTTGAAATTTTGTCTAAAGGTTGGAAGTTAG  
 TTGCTAGAAATCCTAGATTAAAGACTTTTTGTATCAGCAAAATTTATTGGAAATTTTTCAAATACGATTGGGTTTCT  
 TCCATTATACCTGTTTTTGTAAACGGAGTTATTAATAAAAACGGAAAGTTACTGGGGATTTCTAATACAGCATACT  
 CTATTGGTATTATAATTAGTGGCTAATTGCTTTTAGGCTATCTGAAAAGTTCTTGTCTGCTAAATGGGAACCCCA  
 30 ATTATTCACCCCAAATCTAAAAACCATCCAGAATCCTTGCTTACGCTTATAGATCTGGATGGTTTTCTTTTTACCCCA  
 ATGGGTGTTTTTACTAGACAAAAAGAGTTTCCCTTTATGGTATAAGTGTAGAAAAAACACAAAAAGAAAGG  
 AAATCACAATGAACAGTTTACCAATCATCACTTCCAAAAACAAGTCTTTTACCAACTATCTTTCTGATGGAGGTCA  
 TTTAACCCAGTATGGTGGTCTTATCTTTTTTCAAGAACTTTTTCCAGTTGAACTAAAAGAGCGGATTTCTAAGT  
 ATTTAGTAACGAATGACCAACGCCGTACTGTGCTTATTCGGATTACAGATATCTTTGCCAGTTCTCTTTCAACTG  
 35 TTAACAGGTTATGGAACGGACTATGCTTGTAAAGAAATTGTCAGCTGATGCCTACTT  
 TCCAAAATTTGTTGAAGGAGGGCAGCTTGCTTCACAGCCAACCTTATCCCGTTTTCTTTCCAGAACTGACGAGGAA  
 ACAGTCCATAGTTTGGCATGCCTCAACCTTGAATTTGGTGCATTTCTTTTACAGTTTCACCAAGCTAAACCAACTCA  
 TTGTAGATATCGATTCTACCCATTTCACACTTATGGCAAGCAAGAAGTGTGCTTATAACGCCCACTATCGTGC  
 TCATGGCTATCATCCTCTTTATGCTTTTCGAGGGGAAGACAGGTTATTGTTTCAATGCCAGCTTCGCTCGGTAATC  
 40 GTTATTGTTCTGAAGAGGCGACAGCTTTATCACACCTGTTTGAACGGTTTAAATCAACTTCTCTTTGGAATGGA  
 TAGTGGCTTTGCGACCCCAAAATATACGATTTAATTGAAAAAACAGGGCAATACTACCTCATAAACTCAAGAA  
 AAATAGCTTTCTGAGCCGTCTTGGAGACCTTTCCCTTCCCTTCCACAGGATGAGGACTTAACCATCTTCCGCCAC  
 TCCGCTACTCAGAACTCTCTATCAAGCAGGATCTTGGTCCGACAAGCGTCTGTCTGCCAGTTCTCTGAACGAA  
 AAGAAGGAACTTGTCTACGATGTTATTTCTCTCGTTACAAATATGACGAGTGAACAGGCAAGCAAGCAAGTTTCA  
 45 GCTTTATCGTGGACGTGGTCAAGCCGAGAAATTCATCAAGGAGATGAAGGAGGGATTTTTGGCGATAAAACGGA  
 TAGTTCAACCTTAATCAAAAAACGAAGTTCTGATGATGATGAGCTGTATCGCTACAATCTCTATCTTTTTCTCAA  
 CATCTAGCTGGAGGTGACTTCCAACTTTAACAATCAAAACGCTTCGCCATCTTTTTCTTACGTTGGGAAAAAT  
 GTGTTTCAACAGGACGCAAGCAGCTCCTCAAATGTCTAGTCTCTATGCTTATCCGAATGTTTTTCAAGCACTTA  
 50 TTCTAGGATTAGAAAAAGTCAACCTGAATCTTCTGTTCTTATGAACCACTAGAAGAAAAGCGTCTTAAATGATG  
 CATTA

4169.3

ATGATGGAGTTTTTTCAACAGCTTCTCTATTTAGAGCCATATGGCAATCCTCAGTATTTTGTATATGTGATTGCTGC  
 AACCTTGGCCATCTTTATAGGTCTCTTTTCAAGAAACGCTTTGCGTGGTATGAAGTGTGGTAAAGTCTCTCTTTA  
 55 TTGTCACCATGTTGGTGGGTGGAAAGACCAATCAACTAGCTGCTTGGGTATTTACCTTTGCTGGGAAATATTGCT  
 CCTGCTTTTCTACAAGCATTATCGAAAAAGCAAGGATGGCAAGTGGGTCTTCTACTTATGTTTCTGTCCCTA  
 CTTCCGATTATCTTTGTCAAGGTGCAACCAGCTATCAATGGAACGCACTTTGCTTGGGTCTTGGGAATTTCTTA  
 CCTGACCTTTCTGTTGCGTTGGAATTTGTCATCGAGCTGAGAGATGGAGTGATTAAAGATTTTACCCTCTGGGAATTC  
 CTCCGTTTCTTCTCTCATGCCAACTTTCTCGAGTGGTCCAATCGATCGCTTTAAGCGATTTAATGAAAAATTATCA  
 60 GGCTATTCCTGAGCGAGATGAGTTGATGGATATGCTGGATGAATCTGTCCGCTATATCATGTGGGGCTTTTGTAT  
 AAGTTTATCTAGCTCATGTTTTAGGAGAGACCTTACTACCTCTCTGAAGAAATTTAGCCTTGCAGTCAGGTGGCT  
 TCTTTAATCTCTATGCTTGGCAGTTATGTAATCTTTGGTCTGGAACCTCTTCTTGAATTTGCAAGTTATTTCTATGT  
 TTGCTTTGGCCATCTCAAACTTGTAGGGAATCCGTAGCCCTATCAACTTTAACAAGCCCTTTTATCAAGGGATT  
 AAAGGAGTTTTGGAATCGCTGGCATATGAGTCTGCTCTGTTTCCGTGACTTTGTCTTTATGCGAATGGTGATG  
 65 GTGTTAACAGAAAAGAAAGTCTTTAAAAATCGTAATGTAACCTCAAGCATGGCCTACATTGTAATATGCTGATTA  
 TGGGATTTTGGCATGGTGTGACCTGGTACTATATCGCCTATGGACTCTTTCATGGACTAGGCTTGGTCATCAATGA

TGCCTGGGTTGCGAAGAAAAAAGCGTCAATAAGGAACGGAAAAAAGCAGGGAAGGCTGCCCTACCTGAGAATC  
GCTGGATTGAGTTGCTGGCATGGTTGTCACTTCCATGTTGTGTCATGTTGTCATTCTTAATCTTTCTGGATTCTTGA  
ATAATCTATGGTTTAAAAAATAA

- 5 4169.4  
ATGCTTAAACGCTTATGGATGATCTTCGGACCGGCTTGATCGCTGGTTTGTGGTTTTCTGCTCAITTTCTTTTAT  
CCTACTGAGATGCATCATAATCTAGGAGCTGAAAAAGCGTTCAGCAGTGGCTACTACTATCGATAGTTTTAAGGAGC  
GAAGTCAAAAAGTCAGAGCACTATCTGATCCAAATGTGCGTTTTGTTCCCTCTTTGGCTCTAGTGAATGGCTTCG  
10 TTTGACGGTGCTCATCCTGCGGTATTAGCTGAGAAATACAATCGTTCCTACCGTCTTATCTTTTAGGACAGGGG  
GGAGCTGCATCGCTTAACCAATATTTTGAATGCAACAGATGTTACCACAGCTGGAGAATAAACAAAGTTGTGTAT  
GTTATCTCACCTCAGTGGTTCAGTAAAAATGGCTATGATCCAGCAGCCTTCCAGCAGTATTTAATGGAGACCAGT  
TGACTAGTTTTCTGAAACATCAATCTGGGGATCAGGCTAGTCAATATGCAGCGACTCGCTTACTGCAACAGTTCCTC  
15 AAACGTCAGTATGAAGGACCTGGTTCAGAAGTTGGCAAGTAAAGAAGAAATGTCGACAGCAGACAATGAAATGAT  
TGAATATTGGCTCGTTTTAATGAACGCCAAGCTTCTTTTGGTTCAGTTTTCGGTTAGAGGCTATGTTAACTACG  
ATAAGCATGTAGCTAAGTATTTAAAAATCTTGCCAGACCAGTTTTCTTATCAGGCAATAGAAGATGTTGTCAAAGC  
AGATGCTGAAAAAAATCTTCCAATAATGAGATGGGAATGGAAAAATTATTTCTATAATGAGCAGATCAAGAAGGA  
TTTGAAGAAATTAAGGATTCTCAGAAAAAGCTTTACCTATCTCAAGTCGCCAGAGTATAATGACTTGCAGTTGGTT  
20 TTAACACAGTTTTCTAAATCTAAGGTAACCCGATTTTTATCATTCACCTGTTAATAAAAAATGGATGAACATG  
CTGGTCTACGAGAGGATATGTACCAACAAACGGTGCAGAAAGATTGCTACAGGTTAGAAAAGTCAAGGTTTTACCA  
ATATAGCAGATTTTTCTAAGGACGGCGGGGAGCCTTTCTTTATGAAGGACACCATTACCTTGGTGGTGGGTTG  
GTTGGCTTTTGACAAGGCAGTTGATCCTTTCTATCCAATCCCACACCAGTCCGACTTACCATCTGAATGAGCGC  
TTTTTCAGCAAAGATTGGGCGACTTATGATGGAGATGTCAAAGAATTTCAATAG
- 25 4169.6  
ATGGAGAAAAACCTCAAGGCTTTGAAACAAACAACAGACCAAGAAGGCCAGCAATTGAACCTGAAAAGGCAGAG  
GGATACCAAGACAGTCCAAAATGGTTACTTCGAGGATGCGACTGTCAAGGACCGCACCTTGAGTGAATGCAGG  
TAACCTGGCAATCAGTTTATCCTTTCTTGAAGACGGCAGTTTGACCAAGTCTTTGACTACAAGGCTAAGTTGACT  
GGTAAGATGACCCAGGCTGAGTACAAGGCTTACTATACAAAAGGCTATCATAACAGATGTGACTAAGATTAACT  
30 ACTGATAATACTATGGAATTTGTTCAAGGTGGACAAAGCAAGAAATACACTTACAAGTATGTCGGTAAGAAAAAT  
TTGACTTACAAGAAAGGCAATCGTGGCGTGGCTTCTCTTTGAAGCCACAGATGCTGACGCTGGACAATTCAAGT  
ATGTTCAAGTTTGTGACCAACAATGTTGCCCGAGTTAAGGCAGAACATTTCCATATCTTCTTTGGAGGCACAAGCCA  
AGAAGCCCTCTTTGAAGAAATGGACAATGGCCAACTACTACCCAGATAACCTATCTGGCCAAGAAATCGCCCA  
AGAAATGTTGGCGCATTGA
- 35 4170.3  
ATGAAAGATGGTCATTTGCTAGCCCATCATATTCGTTTGTGAATGGGCGGATTTTTCAAAAGTTACTGAGTCAAG  
ATCCTGAGGCTCTTTATAGGGGTGAACAGGGCAAGATTTAGCGGTTTTATGGAATAGTGAACCTGGCTGCGCAA  
CTGCGACAGATATCGCGCTTGCGACTGGACTTGCGAATAATACGCTGACGACTATGATAAAAAAGCTAGAGGAAC  
40 AAAAGCTTGTAATTGTTAGTCCGTGTGGAAGACAAGCGTAAGAAGTATTTAGTTTTAACGGAGTTAGGCAAGT  
CCCAGAAAGAAGTGGGGCATCGTGTGATCAGTCAAGAAATGGATACTATCTTTTACAAAGGATTTTCAGAGGAAGAA  
TTCACCAATTTGAAGGTTTTCAAGAAAGAATTTTGCGGAATCTGAAAGAGAAGGGAATGAGGTTTGA
- 45 4170.4  
ATGACTAATTTAATTGCAACTTTTCAGGATCGTTTTAGTGATTGGTTGACAGCTCTATCTCAACATTTGCAGTTGTC  
GCTTTTGACCTTGTTACTAGCTATTTTGCTTGGGATTCCCTTGGCTGTTTTCTTCGCTATCATGAGAAGCTGGCCG  
ACTGGGTCTTGCAATTGCAAGTATTTCCAGACCATCCCGTCTCTGGCCTTGTGGGGCTCTTATCCCTTTGATG  
GGAATTTGGGACCTTGGCGGCTTTGACAGCTCTAGTGATTTATGCGATTTTCCCTATTTTGCAAAATACTATCACTG  
50 GGCTGAAGGGAAATTGATCCGAACCTGCAAGAGGCTGGGATTGCCTTTGGGATGACCAGATGGGAACGCTCAAGA  
AATTTGAAATTCACCTCGCCATGCCGTTATCATGTCTGGGATTCGGACGGCAGCTGTTTTGATTATCGGTACGGC  
AACCTTGGCGGCTTGATTGGTGCAGGGGACTAGGTTCTTTTATCTTTTGGGAATTGACCGTAATAATGCCAGT  
TTGATTTTGATTGGGGCACTTTCTTCGAGTGCTAGCCATTGCCTTAACTTCTACTAAAAGTGTGAAAAAAG  
CAAATTTACGGACGATTTTCTCAGGTTTTGCTTGGTGGCTTTATTACTGGGTCTGCTTATAGTCCAGCTCTTTTG  
55 GTTCAAAAAAGAGAAGGAAAACTTGGTTATTGCTGGGAAAAATAGGTCCAGAACCAAGAAATTTGGCCAATATGTAT  
AAGTTGCTGATTGAAGAAAAATACCAGCATGACTGCGACTGTTAAACCGAATTTTGGGAAGACAAGCTTCTTTATG  
AAGCTCTGAAAAAAGGCGATATTGACATCTATCCTGAATTTACTGGTACGGTGACTGAAAGTTTGCTTCAACCATC  
ACCCAAGGTGAGTCATGAACCAAGAACAGGTTTATCAGGTGGCGCGTGATGGCATTGCTAAGCAGGATCATCTAGC  
CTATCTCAAAACCATGTCTTATCAAAACACCTATGCTGTAGCTGTTCCGAAAAAGATTGCTCAAGAATATGGCTTG  
AAGACCATTTTCAGACTTGAAAAAAGTGAAGGGCAGTTGAAGGCAGGTTTACACTCGAGTTTAAACGACCGTGAA  
60 GATGGAAATAAGGGCTTGCAATCAATGTATGGTCTCAATCTCAATGTAGCGACCAATTGAGCCAGCCCTTCGCTATC  
AGGCTATTCAAGTCAGGGGATATTCAATCAGCGATGCTTATTCGACTGATGCGGAATTGGAGCGTTATGATTACA  
GGTCTTGGAAAGATGACAAGCAACTCTTCCACCTTATCAAGGGGCTCCACTCATGAAAGAAGCTTCTCTCAAGAA  
ACACCCAGAGTTGGAAAGAGTTCTTAATACATTGGCTGGTAAGATTACAGAAAGCCAGATGAGCCAGCTCAACTA  
65 CCAAGTCGGTGTGGAAGGCAAGTCAGCAAGCAAGTAGCCAAGGAGTTTCTCCAAGAACAAAGGTTTGTGGAAGAA  
ATGA

- 4170.5  
ATGATGCATACTTATTTGCAAAAAGAAAATTGAAAATATCAAAAACACCCTAGGTGAAATGTCAGGTGGTTACCGT  
CGTATGGTTGCGGCTATGGCTGATTTAGGATTTTCAGGAACATGAAGGCTATCTGGGATGACCTCTTTGCCCATC  
GTAGTTTGGCCAGTGGATTTATTTGCTGGTTTATAGGAAGTTTCTCTCTGGCTGGAGTTGGTTACGAACATCGT  
5 ATGTGTTGACTGGATTGGGATGATTTGTAGCTTGACAGGATTATCTGTGAATCTTTGTATCGGAAGGTGAGCAA  
GTAATTATCTTTTGGCTTGATTAACCTCTGTTATTTACCTTATTTTGGCCCTACAGAAAGGCTTTATGGTGAGGTG  
CTGACGACACTTTACTTCACAGTCATGCAGCCAATTGGACTTCTAGTTTGGATTTATCAGGCACAGTTTAAGAAGG  
AAAAGCAGGAGTTTGTGCGCGCTAACTGGACGGCAAGGGCTGGACAAAGTATCTTCCATTAGTGTGCTTTGGT  
10 GGTGGCCCTTTGGCTTCATTTATCAGTCTATTGGTGCCAATCGTCCCTATCGTGATTCAATCACAGATGCAACCAA  
TGGGGTAGGGCAAATCCTCATGACAGCTGTTTACCGTGAACAGTGGATATTCTGGGCGGCTACCAATGTCTTTTCA  
ATCTATCTCTGGTGGGAGAAAGCCTGCAAAATCAAGGGAATATCTAATTTATCTCATTAAACAGTCTAGTTGGTT  
GGTATCAATGGAGCAAGGCAGCTAAGCAGAATACTGATTACTTAACTAG
- 4170.6  
15 ATGAGAAATATGAAGGCAAAATATGCTGTTTGGGTGGCTTTTTCTTAAATTTGACTTATGCCATTGTTGAGTTTAT  
TGCAGGTGGAGTATTTGGTTCTAGCGCTGTTCTGTGACTCTGTGCATGACTTGGGAGATGCGATTGCAATTGGA  
ATATCAGCTTTTCTAGAAAATCTCCAATCGTGAAGAAGACAATCAGTACACCTTGGGCTATAAGCGGTTTAGCC  
TGCTAGGAGCCTTGGTAACAGCTGTGATTCTCGTAACGGGCTCTGTTCTAGTCAATTTGGAAAATGTCACGAAGAT  
20 TTTGCATCCGCAACCACTCAATGATGAGGGGATTCTCTGGTTAGGAATTATTGCGATTACTATCAATCTGTTAGCG  
AGTCTGGTGGTTGGTAAGGGAAAGACAAAGAATGAGTCTATTCTGAGTCTGCATTTTCTGGAAGATACGCTAGGG  
TGGGTAGCTGTTATCTGATGGCGATTGTTCTCGATTTACGGACTGGTATATCTAGATCTCTTTTGTCCCTTGT  
CATTTCTTTCTTTATTCTTTCAAAGCCCTTCCAGTTTTTGGTCTACACTCAAGATTTTCTTGGATGCTGTGCCAG  
AAGTCTTGATATCAAGCAAGTAAAGAGTGGCCTGGAGCGATTGGACAATGTGGCCAGCCTTAATCAGCTTAATC  
25 TCTGGACTATGGATGCTTTGGAAAAAATGCCATTGTCCATGTTTGTCTAAAAGAAATGGAACATATGGAACCTTG  
TAAAGAGTCTATTGCAATTTTCTTAAAGATTGTGGTTTTCAAATATTACCAATTGAAATGATGCTGACCTAGAA  
ACTCACCAAAACCCATAAGCGAAAGGTGTGTGACTTGAACGGAGTTATGAGCATCAACATTAG
- 4170.8  
30 ATGATTGAATACAAAAATGTAGCACTGCGCTACACAGAAAAGGATGTCTTGAGAGATGTCAACTTACAGATTGAG  
GATGGGGAATTTATGGTTTTAGTAGGGCTTCTGGGTGAGGTAAAGACGACCATGCTCAAGATGATTAAACCGTCTTT  
TGGAAACCACTGATGGAATATTTATATGGATGGGAAGCGCATCAAAGACTATGATGAGCGTGAACCTCGTCTTT  
CTACTGGTTATGTTTTACAGGCTATTGCTCTTTTCCAAATCTAACAGTTGCGGAAAAATATTGCTCTATTCTGAA  
ATGAAGGGGTGGAGCAAGGAAGAAATACGAAGAAAACAGAAGAGCTTTTGGCTAAGGTTGGTTTACCAGTAGCC  
35 GAGTATGGGCATCGCTTACCTAGTGAATTATCTGGTGAGAACAGCAACGGGTGGTATTGTCGAGCTATGATTG  
GTCAGCCCAAGATTTTCTCATGGATGAACCTTTTGGGCTTGGATGCTATTTCGAGAAAAACAGTTGCAGGTCT  
GACAAAAGAAATGCAATAAGAGTTTGGGATGACAACGATTTTGTAAACCCATGATACGGATGAAGCCTTGAAGT  
GGCGGACCGTATTGCTGTCTTGCAGGATGGAGAAATTCGCCAGGTAGCGAATCCGAGACAAATTTAAAAAGCGCC  
TGCAACAGACTTTGTAGCAGACTTGTTTGGAGGTAGTGTTCATGACTAA
- 4171.1  
40 ATGTCAGCAGTTGCTATTTAGCTATGACCAAGGTTATGCAAGAAACCCACGGAAATCCTTCTAGTATTCATGGTC  
ATGGTCGTCAAGCTGGCAAACTCTTGGGAGAAGCCCGTCAGGAACTAGCCAGTTACTAAGGACAAAAACCTCAAC  
ATATCTTTTTCACTTCTGGTGGGACTGAAGGCAATAATACTACCATCATTGGCTACTGTCTTCTGCACCAAGAACA  
45 AGGAAAAATATCATCAAACTGCCATCGAGCACCCTGCTGCTTGAACAATTTGATTACTTGGTTCAACACTTT  
GGGTTTGAAGCAACCAATTATCCAGCCAGAAAAATCAAGAAATCACAGCCAGCAAAATCAAAGGCTTTACGTGAC  
GATACGATTTTGGTTTCTACCATGTTTGTCAATATGAGACAGGAAACCTACTGCCCATCGCTGAAATTTGGCCAAA  
TACTCAAGCAACCCCTGCTGCTATCATGTTGATGACGTTTCAAGGCTATTGGTAAAAATCCCAATTCATTGAGAAGA  
ATTGGGCAATTGATTTTCTCACTGCTTCTGCCCAAAATTCATGGTCCTAAGGGAATCGGTTTTCTCTACGCATCTA  
50 GCATGGACTTTGATTCTATCTACATGGCGGAGACCAGGAACAGAAAAACGTCAGGAACTGAAAAATCTGCCTG  
CCATTGTAGGCAATGGTTGCAGCCCTAAAAGAAGACCTAGAAAAACAAGAAGAACATTTTCAACATGTACAAAATC  
TAGAACTGCCTTTCTGGCAGAGCTGGAGGGCATTCAGTATTACCTGAATAGAGGAAAAATCATCTCTCCCTTATGT  
TCTCAATATTGGATTCTCTGGTCAGAAAAATGACCTCTTACTCCTTGGCTAGATTAGCTGGAATTTCAATCTCTA  
CTGGCTCAGCCTGTACTGCAGGCTGTGTCATCCAGCATGTTCTTGAAGCCATGATGGCGCAAAATCAGAAAGC  
55 CTTGAAGGAATCCCTTCGCATCAGTTTGTGCCACAAAATACCGTTGAAGACCTACAAAACCTCGCAAAAACCTTA  
AAAGAAATATCGGAGGTTAG
- 4172.1  
60 ATGTTATTCAAATATCTAAGGAAAAAATAGAGCTAGGCTTATCTCGTTTATCGCCAGCCCGTCGTATTTTTTTGA  
GTTTTGCCCTTGGTCATTTTACTAGGCTCTCTTCTTTTGGCTTGGCTTGTCCAAGTTGAAAGCTCAGAGCGACT  
TATTTTGAATCATCTTTCACTGCTGTCTCTGAGTCTGTGTGACGGGTCTCTCAACCTTCCAGTAGCTCACACCTA  
TAATATCTGGGTCAAAATAATCTGTTTGTCTTGTATTGATCGGTGGTCTAGGGCTCATGACCTTTATTGGGGTTT  
65 TCTATATCCAGAGCAAGCAAAAGCTTACTCTTCTGATGCCGTGCAACTATTCAAGGATAGTTTATGTTAGGAGAAAC

TCGATCTTTGAGAAAGTTTGTCTATTCTATTTTTCTCAGGACCTTTTTGGTTGAGAGCTTGGGAGCTATTTTGCTTA  
GTTTTGCGCTTATTCTCAACTTGGCTGGGGACGTGGTCTTTTTAGTTCCATTTTTCTAGCGATCTCAGCCTTCTGT  
AATGCCGGTTTTGATAATTTAGGGAGCACCAGTTTATTTGCTTTTCAGACCGATTACTGGTCAATCTGGTGATTGC  
5 AGGCTTGATTATTACAGGCGGCTTGGTTTTATGGTCTGGTTTGATTGGCTGGTCATGTAGGAAGAAAGAAAAA  
GGACGTCTGCACCTTCATACGAAGCTTGTACTATTATTGACTATAGGTTTGTGTTATTTGGAACAGCACTACTCT  
CTTTCTTGAGTGGAACAATGCTGGAACGATTGGCAATCTCCCTGTTGCCGATAAGGTTTTAGTTAGCTTTTTCAA  
ACAGTGACGATGCGAACAGCTGGCTTTCTACGATAGATTATACTCAGGCTCATCTGTGACTCTTTTGATTATA  
10 TCTTACAGATGTTTTCTAGGTGGGGCAGCTGGAGGAACAGCTGGGGGACTCAAGATTACGACATTTTTTGCTCTT  
GGTCTTGCACGAAGTGAGCTTCTAGGCTTGCCTATGCCAATGTTGCGAGACGAACGATCGCGCGCGAACGGTT  
CAAAAATCCTTTAGTGCTTTATTATCTTTTGATGAGCTTCTTGATAGGATTGATTCTGCTAGGGATAACAGCCAA  
AGGCAATCCTCCCTTTATCCACCTCGTATTTGAAACCATTTTCAGCTCTTAGTACAGTTGGTGTAAACGGCAAAATCTG  
ACTCCTGACCTTGGGAAATTGGCTCTCAGTGTTATCATGCCACTTATGTTTATGGG  
ACGAATTTGGTCCCTTGACCTTGTGTTAGCTTGGCAGATTACCATCCAGAAAAGAAAGATATGATTCACTATATG  
15 AAAGCAGATATTAGTATTGGTTAA

4172.2  
ATGTCAGATCGTACGATTGGAATTTTGGGCTTGGGAATTTTTGGGAGCAGTGTCTAGCTGCCCTAGCCAAGCAGG  
ATATGAATATTATCGCTATTGATGACCAGCAGAGCGCATCAATCAGTTTGAGCCAGTTTTGGCGCGTGGAGTGAT  
20 TGGTGACATCACAGATGAAGAATTATTGAGATCAGCAGGGATTGATACCTGCGATACCGTTGTAGTCGCGACAGG  
TGAAAATCTGGAGTCGAGTGTGCTTGGCGTTATGCACTGTAAAGATTGGGGGTACCGACTGTTATTGCTAAGGTG  
AAAAGTCAGACCGCTAAGAAAGTGCTAGAAAAGATTGGAGCTGACTCGGTTATCTGCCAGAGTATGAAATGGGG  
CAGTCTCTAGCACAGACCACTCTTTCCATAATAGTGTGATGCTTTTCAGTTGGATAAAAAATGTGCTATCGTTGG  
AGATGAAAATTCCTCAGTCTTGGGCAGGTCAAAGTCTGAGTAAATTAGACCTCCGTGGCAAATACAATCTGAATA  
25 TTTTGGGTTTCCGAGAGCAGGAAAAATCCCAATTGGATGTTGAATTTGGACCAGATGACCTCTTGAAAGCAGATAC  
CTATATTTTGGCAGTCATCAACAACCAAGTATTGGATACCTAGTAGCAATTGAATTCGTAA

4172.3  
ATGAAGTTATTGTCTATCGCAATTTCTAGCTATAATGCGAGCAGCTATCTTCATTACTGTGTGGAGTCGCTAGTGA  
TTGGTGGTGAGCAAGTTGGGATTTTGATTATCAATGACGGGTCTCAGGATCAGACTCAGGAAATCGCTGAGTGTTT  
30 AGCTAGCAAGTATCCTAATATCGTTAGAGCCATCTATCAGGAAAAATAATGCCATGGCGGTGCGGTCAATCGTGG  
CTTGGTAGAGGCTTCTGGGCGCTATTTTAAAGTAGTTGACAGTGATGACTGGGTGGATCCTCGTGCCTACTTGAAA  
ATTCTTGAAACCTTGACGGAACCTTGAGAGCAAAAGGTCAAGAGGTGGATGTCTTTGTGACCAATTTTGCTATGAAA  
AGGAAGGGCAGTCTCGTAAGAAGAGTATGAGTTACGATTACGTCTTGCCTGTTCCGGCAGATTTTGGCTGGGACCA  
35 GGTGCGAAATTTCTCCAAAGGCCAGTATACCATGATGCACTCGCTGATTATCGGACAGATTTGTTGCGTGCTAGC  
CAGTTCTAA

4172.4  
ATGAAATTCAATCCAAATCAAAGATATACTCGTTGGTCTATTCGCCGTCTCAGTGTGGTGTGCGCTCAGTTGTTG  
TGGTAGTGGCTTCTTTGTCTAGTTGGTCAGCCAAGTTCTGTACGTGCCGATGGGCTCAATCCAAACCCAGGTCA  
40 AGTCTTACCTGAAGAGACATCGGGAACGAAAGAGGGTGACTTATCAGAAAAACCAGGAGACACCGTTCTCACTCA  
AGCGAAACCTGAGGGCGTTACTGGAAATACGAATTCACCTCCGACACCTACAGAAAGAACTGAAAGTGAGCGAGGA  
AACAAGCCCTTCTAGTCTGGATACACTTTTTGAAAAAGATGAAGAAGCTCAAAAAATCCAGAGCTAACAGATGT  
CTTAAAAAGAACTGTAGATACAGCTGATGTGGATGGGACACAAGCAAGTCCAGCAGAACTACTCCTGAACAAGT  
45 AAAAGGTGGAGTGAAAGAAAAATACAAAAGACAGCATCGATGTTCTGCTGCTTATCTTGAAAAAGCTGAAGGGAA  
AGGTCTTTCACTGCCGGTGTAAACCAAGTAAATCCTTATGAACTATTGCTGGTGATGGTATGTTAACTCGTCTA  
TTACTAAAAAGCTTCGGATAATGCTCCTTGGTCTGACAATGGTACTGCTAAAAATCCTGCTTTACCTCCTTTGAAG  
GATTAACAAAAGGGAAATACTTCTATGAAGTAGACTTAAATGGCAATACTGTTGGTAAACAAGGTCAAGCTTTAA  
TTGATCAACTTCGCGCTAATGGTACTCAAACTTATAAAGCTACTGTTAAAGTTTACGGAAATAAAGACGGTAAAGC  
50 TGACTTGACTAATCTAGTTGCTACTAAAAATGTAGACATCAACATCAATGGATTAGTTGCTAAAGAAACAGTTCAA  
AAAGCCGTTGCAGACAACGTTAAAGACAGTATCGATGTTCCAGCAGCTACCTAGAAAAAGCCAAGGGTGAAGGT  
CCATTACAGCAGGTGTCAACCATGTGATTCCATACGAACTCTTCGAGGTGATGGCATGTTGACTCGTCTCTTGC  
TCAAGGCATCTGACAAGGCACCATGGTCAGATAACGGCGACGCTAAAAACCCAGCCCTATCTCACTAGGGGAAA  
ACGTGAAGACCAAAAGGTCAATACTTCTATCAAGTAGCCTTGGACGGAAATGTAGCTGGCAAGAAAAACAAGCGC  
55 TCATTGACCAAGTTCCGAGCAATGGTACTCAAACCTACAGCGCTACAGTCAATGTCTATGGTAACAAAGACGGTA  
AACCAGACTTGGACAACATCGTAGCACTAAAAAAGTCACTATTAACATAAACGGTTTAAATTTCTAAAGAAACAG  
TTCAAAAAGCCGTTGCAGACAACGTTAAAGACAGTATCGATGTTCCAGCAGCTACCTAGAAAAAGCCAAGGGTG  
AAGGTCCATTACAGCAGGTGTCAACCATGTGATTCCATACGAACTCTTCGAGGTGATGGTATGTTGACTCGTCT  
CTTGCTCAAGGCATCTGACAAGGCACCATGGTCAGATAACGGTGACGCTAAAAACCCAGCCCTATCTCACTAGG  
60 TGAAAACGTTGAAGACCAAAAGTCAATACTTCTATCAATTAGCCTTGGACGGAAATGTAGCTGGCAAGAAAAACA  
AGCGCTCAATTGACCAAGTTCCGAGCAACCGGTACTCAAACCTACAGCGCTACAGTCAATGTCTATGGTAACAAAGA  
CGGTAACACAGACTTGGACAACATCGTAGCACTAAAAAAGTCACTATTAACATAAACGGTTTAAATTTCTAAAGA  
AACAGTTCAAAAAGCCGTTGCAGACAACGTTAAGACAGTATCGATGTTCCAGCAGCTACCTAG

4172.5

5 ATGAACTAAAAAGTTATATTTTGGTTGGATATATTATTTCAACCCTCTTAACCATTTTGGTTGTTTTTGGGCTGT  
TCAAAAAATGCTGATTGCGAAAGGCGAGATTACTTTTGGCTTGGGATGACCATCGTTGCCAGCCTTGTGGTGTCT  
GGGATTAGTCTCTTCTCCTATTGCCAGTCTTTACGTCTGTGGGCAAACTCAAGGAGCATGCCAAGCGGGTAGCGG  
10 CCAAGGATTTTCTTCAAAATTTGGAGGTTCAAGGTCTGTAGAATTTTCAGCAATTAGGGCAAACTTTTAATGAGAT  
GTCCCATGATTGTCAGGTAAGCTTTGATTCTTGGAAAGAAAGCGAAGAGAAAAGGGCTTGATGATTGCCAGTT  
GTCCCATGATATTAAAGACTCCTATCACTTCGATCCAAAGCGACGGTAGAAGGGATTGTTGGATGGGATTATCAAGGA  
GTCCGAGCAAGCTCATTATCTAGCAACCATTTGGACGCCAGAGAGGGCTCAATAAACTGGTTGAGGAGTTGAA  
15 TTTTTGACCTTAAACACAGCTAGAAATCAGGTGGAACTACCAGTAAAGACAGTATTTTCTGGACAAGCTCTTA  
ATTGAGTGCATGAGTGAATTTCAAGTTTTGATTGAGCAGGAGAGAAGAGATGTCCACTGTCAGGTAATCCCAAGAT  
CTGCCCGATTGAGGGAGATTATGCTAAGCTTTCTCGTATCTTGGTGAATCTGGTGCATAACGCTTTTAAATATTC  
TGCTCCAGGAACCAAGCTGGAAGTGGTGGCTAAGCTGGAGAAGGACCAGCTTTCAATCAGTGTGACCGATGAAGG  
GCAGGGTATTGCCCCAGAGGATTGGAAAAATATTTTCAACGCGCTTTATCGTGTGAAACTTCGCGTAACATGAAG  
ACAGGTGTCATGGATTAGGACTTGGCATTGCGGTGAATGGCCATCAATTGGGTGGGAAATCAAGTCAAGC  
15 AGCCAGTACGGTCTAGGAAGTACCTTTACCCTCGTCTCAACCTCTCTGGTAGTGAATAAAGCCTAA

4172.6  
20 ATGTTTGGTCAAACGGCTCAACATGGTCTTACGAATAGCCTGAAAGACTTCTGGATTTTCTGCTGAATATAGGTC  
CACAATTGGCGTTTTTTTGGCAGATGCTCCGCTGTTCCAGATCGGTTGAGCAGGGTACTGGAAATCACCGTCGTGA  
GTTCAATATGATTGAGCAGATATTCTCGCATTTTGGGATGACTCACTTGGGACAAATCAAGTTGGTCTATCAAGAG  
TCGATTGACCTTGAGTTGCTGGTCAATGCACTTAATCATCACTTGTCTATTGACAGACTGGTCTCACGCCCAATC  
AAATAACGATAGAAATCGACAGGCAGATAGTACATGGTCTTGACCTGCTGAAGGGGGCTAAAGACAAAGAGATTA  
TCGACATAAAAAGTATGTTCAAGCAGTTAGAACTGGCTAGCACGCAACAAATCTGTCCGATAAATCAGCAGTGC  
ATCATGGTATACTGGCCTTTGGAGAAATTTCCGACCTGGTCCAGCCAAAAATCTGCCGAACAGGCAAGACTGA

25 4174.1  
ATGGAACATTTAGCAACTTATTTTCAACCTATGGAGGAGCTTTCTCGCTGCATTGGGAATTGTATTGGCGGTTG  
GATTAAAGCGGTATGGGGTCTGCTTATGGAGTTGGTAAGGCTGGGCAATCTGCCGACGCTTTACTGAAAGAACAGC  
CTGAAAAGTTTGCTCAGCTTTGATATTGCAATTATTGCCCGGAACACAAGGATTATATGGTTTGTATTGGAAT  
30 TTTAATTTGGTTGCAATTAATCCAGAACTTCTTTAGAAAAAGGCGTTGCTTATTTCTTTGTAGCTCTTCCAATTG  
CTATTGTAGGATACCTTTAGCTAAGCATCAAGGAAATGTAGCAGTAGCGGAATGCAAACTCTGGCTAAAAGAC  
CAAAAGAAATTCATGAAGGGAGCAATTTTAGCTGCCATGGTAGAAACCTATGCAATTTCTGCTTTTGTCTATCATT  
CATTTTGACCTTCTGTGTATAA

35 4175.2  
ATGTTAAAAATCAGAAAAACAATCACGTTATCAATGTTAAATGAAGAATTGTCCTTCTATTGGAAGGCGAAACC  
AATGTTTGGCTAATCTTTCCAACGCCAGTCTCTCAAAAATCACGTTTCTTAATACCGTATTGTCAGGCTTTTA  
TTTGTTCGATGGAAAGGAAATGGTTTTAGGCCCTTCCAAGGAGGTGTTTCTGCTATCCGTATTGCACTAGGCAAG  
GGTGTGTTGGTGAGGAGCTCACTTTCAGGAACTGTTATTGTTGGAGATGTGACGACCTATCTCAACTATATTT  
CTTGATAGTCTAGCTAAAAGTGAAATTTGGTGGCGATGATGAAGAATGGTCAGTTACTTGGAGTTCTGGATCT  
40 GGATTTCTCAGAGATTGAGGATTACGATGCTATGGATCGAGATTATTTGGAACAATTTGTCGCTATTTTGCTTGAA  
AAGACAGCATGGGACTTTACGATGTTTGAGGAAAAATCTTAA

45 4175.3  
ATGTCAGTATTAGAGATCAAAGATCTTCAGGTTGAGATTGAAGGAAAAGAAATTTTAAAAGGGGTTAACCTGACC  
CTGAAAACAGGAGAAAATGCCGCTATCATGGGACCAAAATGGTACAGGTAAATCGACTCTTTCTGCGGCTATCATG  
GGAAATCCAAACTATGAAGTAACTAAAGGTGAAGTTTGTGTTGATGGCGTAAACATCCTTGAGTTGGAAGTGGAT  
GAGCGTGCGGCTATGGGACTTTTCTTGCTATGCAATACCCATCAGAAATCCCTGGAATTACCAATGCTGAGTTTC  
TTCGTGCCGCTATGAATGCCGGTAAAGAAGATGATGAGAAGATTTCACTTCGTGAGTTTATTACTAAGCTAGATGA  
50 AAAAAATGGAATTGCTCAACATGAAAGAAGAAATGGCAGAGCGTTACCTCAACGAAGGCTTCTCTGGTGGTGAGAA  
AAAACGCAATGAAATTTCTCAACTTTTGTGTTGGAGCCAACATTTGCTCTTTTGGACGAGATTGACTCAGGTCTT  
GATATTGACGCTCTTAAAGTTGTGCTTAAAGGTGTCAATGCCATGCGTGGTGAAGGTTTTGGTGTATGATCATCA  
CTCACTACCAACGCTTTTGAACATATACACCTGATGTGGTACAGGTGATGATGAAGGTGCTGTGCTCTTC  
60 TGGTGGTCCAGAAATGGCTGCGGCTTTGGAACGTGAAGGATACGCAAAATAGCTGAAGAATTTGGCTACGACTA  
CAAGGAAGAATTGTAA

55 4174.4  
ATGCCCTACAAAAGACAAAGGAGTTTTTCAATGGCACTTTCTAAACTAGATAGCCTTTATATGGCAGTGGTAGCAG  
ACCATTCGAAAAATCCACATCAACGAAGGAAGTTAGAAGATGCTGAGCAAAATCAGTCTCAACAATCCGACTTGTG  
GGGATGTATCAACCTCTCTGTCAAGTTTGTATGCAGAGGACCGTTTGGAAAGATATTGCTTTTCTAAATTCAGGATG  
CAGGATTTCAACTGCTTCTGCTAGTATGATGACAGATGCCGTTTTAGGAAAAACCAACAAGAAATTTTGAAGTGT  
60 GCGACTATTTTTCTGAAATGGTTCAAGGGCAAAAGATGAGCGTCAAGACCAACTTGGAGACGCGGCATTCTTG  
TCAGGTGTTGCCAAATTCCTCAAAGAATCAAGTGTCAACCTAGCTTGGAAATGCCCTTAAGAAAAACAATTGAA  
AATCAAGAAAAACAGTAA

4175.5

5 ATGAAAATTCAAGACCTATTGAGAAAAGATGTCATGTTGCTAGATTTGCAGGCAACTGAAAAACAGCTGTCATC  
 GACGAGATGATTAATAAATTTGACAGACCACGGTTATGTAACAGATTTTGAAACATTTAAAGAAGGAATTTGGCG  
 CGTGAAGCTTTGACTTCTACTGGTTTGGGTGATGGAATCGCAATGCCTCAGCAAAAAACGGTGTGTCAAAGAA  
 10 GCGACAGTTCTATTTGCTAAGTCAAATAAGGGTGTGACTACGAGAGCTTGGATGGACAAGCAACTGACCTCTTCT  
 TCATGATTGCAGCTCCAGAAGGTGCCAATGATACTCACTTGGCAGCCTTGGCAGAATTGTCTCAATCTTGATGAA  
 AGACGGTTTTCAGACAAAACCTTCGTCAAGCAACATCTGCAGACCAAGTTATCGAACTTTTTCACCAAGCTTCAGAA  
 AAACTGAGGAACCTGTTCAAGCACCTGCTAATGACTCTGGTGACTTTATCGTAGCTGTTACAGCTGTACAAACAG  
 15 GATTTGCCACACTTACATGGCCCAAGAAGCCCTTCAAAAAAGTAGCTGCTGAAATGGGGGTTGGTATCAAGGTCG  
 AAACCAACGGTGCTAGCGGTGTGGAAATCAACTAAGTGCAGAAGATATCCGTAAAGGCTAAAGCTATTATCATTG  
 CAGCAGACAAGGCCGTGAAATGGATCGATTGATGGAACCACTTGTATCAATCGTCCAGTTGCTGACGGTATCC  
 GTAAGACAGAAGAGCTAATTAACCTTGGCTCTTTCAGGAGATACTGAAGTCTACCGTGGCGCTAATGGTGCCAAAG  
 CTGCAACAGCCTCTAACGAAAAACAAAGCCTTGGTGGTGCCTTGTACAAACACTTGTAGAGTGGTGTATCTCAAA  
 TGTACCATTTCGTATCGGTGGTGGTATCATGATTGCCCTTGCCTTCTGATTGACGGTGCCTTGGGTGTTCCAAAT  
 20 GAAAACTTGGCAATCTTGGTCTTACCATGAGTTAGCTTCTATGTTTCATGAAAAATGGTGGAGCTGCCTTTGGTTT  
 TTTCAAGTGGATACGAAAAACAGGAAGGTCTAATCAATCCTTCTATTGCCACTTCTGGAAACAATCTTGACAG  
 GATTGTTATGCTAGCTGTGAATATCCCAATGGCTGCAATCAACACTGCTATGAATGACTTCTAGGCGGTCTTGG  
 AGGAGGTTACAGCTGTCCTTCTTGGTATCGTCTTGGTGGAAATGATGGCTGTTGACATGGGTGGACCAAGTTAATAAA  
 GCAGCTTATGCTTTGGTACAGGTACGGTTCAGCAACTGTTTCTTCAAGTGGTCTGTAGCCATGGCAGCAGTTA  
 25 TGGCTGGAGGAATGGTGCCCACTTGCATCTTGTGCGCAACTCTTCTTTCAAAGATAAAATTTGCAAGGAAGA  
 ACGTAACTCTGGTTTGACAAACATCATATGGGCTTGTCAATTTACTGAGGGAGCGATTCCATTGGTGGCGCT  
 GACCCAGCTCGTGGGATTCCAAGCTTCATCCTTGGTTCAAGCAGTAGCAGGTGGACTCGTTGGTCTTACTGGTATCA  
 AACTCATGGCGCCACACGGAGGAATCTCGTTATCGCCCTTACTTCAAATGCTCTCTTACTCGTTCTGTCTTG  
 GTAGGAGCAATCGTAAGTGGTGGTATTATGGTTACCTACGCAAAACCAAGCATAA

4175.6

30 ATGGCAAAACAAGATACAAGTACAACAAGACGGAGACCGTCTAAAGCAGAACTGGAAAGAAAAGAGCGATTCA  
 ACGAATGTTGATTTTCGTTAGGAATTCGATTTTATGATTTTCGACGCTTCAAATAGGGGCTGCAGGTATAAACC  
 CTTTATAATTTAATTCGCTTGTAGTGGGTAGCCTAGCTTATCTGGCGATATTCGGCCTATTAATCTATCTTCTT  
 TTTCAAGTGGATACGAAAAACAGGAAGGTCTTATCTGGCTTTTTCACCATATTTGCTGGCTTACTCTTGATTTTGG  
 35 AGGCCTACTTGGTTTGGAAATATGGTTTGGACAAGTCCGTTCTAAAAGGGACCATGGCTCAGGTTGTGACAGATCT  
 GACTGGTTTTGCAACGACTAGCTTTGCTGGAGGGGGCTTGTACGGGGTCCGCTTTTATATTTCAACAGCCTTTCTC  
 TTTTCAAATATCGGAACCTTACTTTATGGTCTATCTTGATTTTATGGGTTCTCTCCTAGTCAGCCCTTGGTCTGTT  
 TACGATAATGCTGAATTTTTCAGTAGAGGCTTTGGCCAAATGGTGGGAAGGGCAGGAGCGTCGAAAGAGGAACGC  
 40 TTTGTCAAAACAAGAAAAAGCTCGCCAAAAGGCTGAGAAAGAGGCTAGATTAGAAACAAGAGAGACTGAAAA  
 AGCCTTACTCGATTTGCCTCCTGTTGATATGGAACGGGTGAAATTTCTGACAGAGGAAGCTGTTCAAAATCTTCCA  
 CCTAATTCGCAAGAAAAAGTGGGTGGAAACCAAGAAATCCTGCTCAAGCTGAACCTTAAATCTTCCCTGAACGGAA  
 GATGACTCAGATGACGAAGATGTTACGGTGCATTTTCAGCCAAAGAGCCCTTGAATACAACTTCCAAGCTTA  
 CAAGCTTTTGCACAGATAAACCAAAAGATCAGTCTAAAGAGAGAAAAATTTGTCAGAGAAAAATCAAAATCTTA  
 45 GAAGCAACCTTTGCTAGCTTTGGTATTAAGGTAAACAGTTGAACGGGGCGAAATTTGGGCCATAGTGAAGCAAT  
 GAAGTCAAGCCGGCTGTTGGTGAAGGGTCAACCGCATTTCCAATCTATCAGATGACCTCGCTCTAGCCTTTGGCTG  
 CCAAAGATGTCCGGATTGAAGCACCAATCCTGGGAAAATCCCTAATCGGAATGAAGTGCCCACTCCGATATTG  
 CCACTGTATCTTTCCGAGAACTATGGGAACAATCGCAAAACGAAAGCAGAAAAATTTCTTGGAAATCTTTTAGGGA  
 50 AGGCTGTTAATGGAACCGCAAGAGCTTTTGACCTTTCTAAAAATGCCCACTTGTAGTTGCAGGTTCAACGGGTTT  
 AGGGAAGTCAGTAGCAGTTAACGGCATTATTGCTAGCATTCTCATGAAGGCGAGACCAGATCAAGTTAAATTTAT  
 GATGGTTCGATCCCAAGATGGTTGAGTTATCTGTTTACAATGATATTTCCCACTCTTGAATCCAGTCTGTGACCAAT  
 CCACGCAAGCCAGCAAGGCTCTGCAAAAGGTTGTGGATGAAATGGAAAAACCGTTATGAACTCTTTGCCAAGGTG  
 55 GGAGTTCCGGAATATTGCAGGTTTAAATGCCAAGGTAGAAGAGTTCAATTTCCAGTCTGAGTACAAGCAAAATCCG  
 CTACCAATTCATTGTCTGATTTGTGGATGAGTTGGCTGACCTCATGATGGTGGCCAGCAAGGAAGTGGAAAGATGCTA  
 TCATCCGCTTTGGGCAGAAAGGCGCGTGTGCAAGTATCCACATGATTTCTTGCAACTCAGCGTCCATCTGTTGATGT  
 CATCTCTGTTTGAATTAAGGCCAATGTTCCATCTCGTGTAGCATTTGCGGTTTCATCAGGAACAGACTCCCGTACG  
 60 ATTTTGGATGAAAAATGGAGCAGAAAACTTCTTGGTCCGAGGAGACATGCTCTTAAACCGATTGATGAAAAATCAT  
 CCAGTTCGCTCTCAAGGCTCCTTTATCTCGGATGACGATGTTGAGCGCATTTGAACTTCATCAAGACTCAGGCAG  
 ATGCAGACTACGATGAGAGTTTGGATCCAGGTGAGGTTTCTGAAAAATGAAGGAGAAATTTCCGATGGAGATGCTG  
 GTGGTATCCGCTTTTGAAGAAGCTAAGTCTTTGGTTATCGAAACACAGAAAGCCAGTGGCTCTATGATTCAGCG  
 TCGTTTATCAGTTGGATTAAACCGTGGACCCGCTCATGGAAGAACTGGAGATAGCAGGTGTATCGGTCAGCT  
 GAAGGTACCAAAACCTCGAAAAAGTGTACAACAATAA

4176.1

65 ATGAGTTATTTTAAAAAATATAAATTCGATAAATCCCAGTTCAAACCTTGGTATGCGAACCTTTAAAAACAGGTATTG  
 CTGTTTTCTAGTTCTCTTGAATTTTGGCTTTTGGCTGGAAAGGTCTTCAAATTTGGTGTCTTGACAGCCGTTTTTA  
 GCCTGAGGGAGAGTTTTGATGAGAGTGTTCATTTTGGGACTTCGGTATTTCTAGGAAATAGTATCGGTGGACTCTA  
 TGCTTGGTCTTCTTCTTATTAATACCTTTTCCACGAAGCCTTTGGGTGACCTTGGTATGTTTCAATCTGCA

CCATGTTAACCATTATGACAAATGTAGCCATGAATAACAAAGCAGGGGTTATTGGTGGTGTAGCAGCTATGTTAAT  
CATTACCCTATCAATTCGAAGTGGTGAGACAAATTTGTACGTGTTTGTGCGTGTATTAGAAACGTTTATGGGAGTT  
TTTGTGCAATTATCGTAAATTACGATATTGATCGTATTCGTCTCTTTTAGAGAAAAAGAAAAATAA

5

4178.2

10

ATGAATAAATCAGAACACCGCCACCACTTATACGGCTCTTATCACAAAAACAAGATTCATACACAGGCTGAG  
TTGCAAGCCCTTCTTGTGAGAACGACATTCAAGTAACCCAGGCAACCCCTCTCACGGGACATCAAAAAATGAAC  
CTATCAAAAGTCCGGAAGAAGATAGCGCTTATTATGTTCTTAACAATGGTTCCATCTCAAAATGGGAAAAACGTC  
TCGAACTCTACATGGAAGACGCCCTTGTCTGGATGCGCCAGTTCACACCAAGTCTACTAAAAACCCCTTCTG  
ACTGGCTCAATCCTTGGTTCTATCATGTAAGTCTTGGCTTCCCTGACGCTATCGCTACCCTTGTGGTAATGATG  
TCTGTCTTATCATCTGTGAAGATGCAGATACTGCTCAAAAGTGGTTGAAGAACTGAAAAAATTCGCCCCACCAT  
TTCTTTGAAGAATAA

15

4179.1

20

25

30

35

ATGAAAAGTATAAAATTAATGCTCTATCTTACATGGGAATTCGTGCTTGAATATTATTTTCCCATCTAACTGG  
AACCTATGTCGGCGGTGTCTTGGACCGAAGTACTATGGTTACTTCAACTCAGTCGACACTATTTTGTCAATTTTCT  
TGCCCTTTGCAACTTATGGTGTCTATACTACGGTTTAAAGGCTATCAGTAATGTCAAGGATAACAAAAAGATCT  
TAACAGAACCCTTTCTAGCTTTTTTATTTGTGCTCGCTTGTACGATTTTGACCACTGCTGTCTATATCTAGCCT  
ATCTCTCTTCTTACTGATAATCCAATCGTCAAAAAGGTCTACCTTGTATGGGGATTCAACTCATTGCCAGATT  
TTTTCAATCGAATGGGTCAATGAAGCTCTGAAAAATTACAGTTTCTCTTTTACAAAACTGCCTTCATCCGTATCCT  
GATGCTGGTCTCTATTTTCTTATTTGTTAAAAATGAACAGGATATTGTTGTCTATACACTTGTGATGATTTATCGA  
CGCTGATTAACCTACCTGATTAGTTATTTTGGATTAAAGAGACATCAAACTTGTAAAAATTCACCTAAGTATT  
TAAACCACTCTTCTCCCTCTGACAGCCATGTTAGTCTTTGCCAATGCCAATATGCTCTTCACTTTTTAGATCGCC  
TCTTCTCGTTAAAAACAGGATTGATGTCAACGTTAGTTACTATACCATAGCTCAGCGAATTGTGACCGTTATAGC  
TGCGGTTGTAAACAGGTGCAATTGGAGTGAAGTGGCTCGCTCGTCTCAGTTACTATCTGGGGAAGGAGACAAAGAAGC  
CTATGTTTCTCTGGTTAATAGAGGTAGTGAATCTTTAACTCTTTATCATTCCACTGAGTTTGGACTCATGGTTT  
TAGGACCAAAATGCCATCCTACTTACGGTATGTAAGAAATATATCGGAGGCGGCATCTTGACCTCTCTCTCGCTT  
TCGTACGATTATCTGGCCTTAGATACCATCTTGGTTCCCAAAATCTCTTACCAATGGCTATGAAAAACGTATC  
ACAGTCTATACAGTCTTGTCTGGCTACTCAATTTGGGCTTGAATAGTCTCTCTTTTCAACCATATCGGGTCC  
TGAATACTACTTACTGACAACTATGCTATCAGAGACTTCTCTACTTGTCTTATATCATTTTCATCCATAGAAAAAC  
AACTCATCCACTGGGACATATCTTAGCTATCTGTCGATCTCTCTTTTCACTTTCTTGTAGCAATTTATT  
TCTGTATTAATTTGTTGCTTGTCTATCAGCTATCTCTTATATTAGTCTACTTGTCTTACAAAAAGATAGCATTCTAT  
ATACTGGTTTGAATGTTGCTATCAGCTATCTCTTATATTAGTCTACTTGTCTTACAAAAAGATAGCATTCTAT  
GAATTTTTAAACCATGCTCTAGCCTTAAAAAATAAATTTAAAAATCATAG

40

45

4179.2  
ATGAAACAACCTAACCGTTGAAGATGCCAAACAAATGAATTAGAAATTTTGGATTATATTGATACTCTCTGTA  
AGCACAATATCAACTATATTAACTACGGTACTCTGATTGGGCGGTTTCGACATGAGGGCTTATCCCTTGGGA  
CGACGATATTGATCTGTCCATGCTAGAGAAGACTACCAACGATTTATTAACATTTTCAAAAGGAAAAAGCAA  
GTATAAGCTCCTATCCTTAGAACTGATAAGAAGTCTTTAAACAATTTATCAAGATAACCGACAGTACGACTAAA  
ATTATTGATACTCGAAATACAAAAACCTATGAGTCTGGTATCTTTATCGATATTTCCCTATAGATCGCTTGTATGA  
TCCTAAGGTCTTGTATCTTGTATAAACTGGAAAGCTTCAAACTGCTGTCTTTTCACTAAACATAAAAAATATTGTC  
TATAAGGATAGCCTTTTAAAGATTGGATACGAACAGCCTTCTGGTTACTCTTTCGACCGGTTTCTCTCGTTATT  
TGCAAAATAAAATCGAGAAAGAAATTCAAAAATATAGTCTGTAAGAAATGGGCAATATATGGCTTTATCCCTTCAA  
ATTTAAGGAAAAAGGAAGTCTTCCCAAGTGTACCTTTGATAAAAAACATCGATTTACCCTTGTAGAAATTAAGCCTT  
CCTGCACCTGAAAAATTTGATACTATTTTGACACAATTTTATGGAGATTATGACCCTACCACGAGAAGAAAAAC  
GCTTCTACAGTCATGAATTTACGCTTATAAATTTGAGGATTAG

50

55

60

65

4179.3  
ATGATAAAAAATCAATCATCTAACCATCACAAAAACAAAGATTTACGAGATCTTGTATCTGACCTAACCATGACC  
ATCCAAGACGGGGAAAAAGGTTGCTATTATTGGTGAAGAAGGAAATGGCAAAATCAACCTTACTTAAAAATTTAATG  
GGGAAAGCTTTGTCTGATTTCACTATCAAGGGAACATCCAACTGACTATCAGTCACTGGCTACATTCCTCAAA  
AAGTCCCTGAGGACCTAAAAAGAAAACTTTACAGGACTACTTCTTTTATGATTCTATTGATTAGACTACAGTAT  
CCTCTATCGTTTGGCGGAGGAATTCATTTTGTATAGCAATCGTTTCGCAAGTGACCAAGAGATTGGCAATCTATCA  
GGGGCGAAGCTTTGAAAAATCAGCTTATCCATGAGTTAGCCAAACCCCTTTGAGATTCTATTTTATAGTGAACCTT  
CAAAATGACCTAGACCTTGAGACAGTTGATTGGCTAAAAGGCCAGATTCAAAAGACCAGGCAAAACCGTTATTTTCA  
TTTCCCATGATGAAGACTTTCTTTCTGAAACGGCAGACACTATTGTTCACTTGGGACTGGTCAAAACACCGTAAAGA  
AGCGGAAACGCTAGTAGAGCATTTAGACTATGATAGCTATAGTGAGCAGAGAAAGGCTAATTTTGCCAAACAAAG  
TCAGCAAGCTGCTAACAAACCAAGAGCCTACGATAAAACCATGGAACAAACATCGGAGAGTTAAGCAAAATGTAG  
AACTGCGCTTCGAGCTACCAAGATAGTACTGCGGCTCGCTATTGGCTAAAAAGATGAAAACTGTCTCTCAC  
AAGAAAAACGCTACGAAAAAGGAGCTCAGTCCATGACTCAAAAGCCACTTGAAGAGGAACAAATCCAACTTTTCT  
TTTACAGACATCCAAACCATTAACAGCTTCTAAAGTCTTAGTCCAAGTGAAGAAAAAGAAAAATTTGTCCATTGACGACCG  
AGTTTTGGTTCAAAAACTACAATACTGTCCGTGGCCAAAGAAAAAATCGGTATTATCGG  
GCCAAATGGTGTGGGAAATCAACTCTGTTAGCCAAGTTACAGAGACTTCTGAATGATAAAAGAGAGATTCACT  
TGGTTTTATGCCACAAGATTACCACAAAAAAGTCAATTTGGATTTATCCCCAATAGCCTATCTCAGTAAAACTGGG



5 GAAAAAGAGGAACTACAGAAAATCCAATCTCACCTAGCTAGTCTCAATTTTCAGTTATCCAGAAAATGCAGCATCAA  
ATTTCGCTCCTTATCTGGCGGACAAACAGGGAAAACTCCTGCTTTTGGATTAGTCTGCGCAAAACCAAACTTTCTCC  
TGCTGGATGAACCCACACGAAACTTTCTCCACTCTCAACCCCAATCAGAAAATCTTTGCTACCTATCCAGG  
CGGTCTCATCACTGTTTTCGATGACCGTCTGTTCTTAAAAAGAGTCTGCTCGATCATCTATCGCATGACAGAACAC  
GGTTTGAAGCTAGTTAATTTAGAAGATTATAA

4179.4  
10 ATGAAACCAAAAACATTTTACAACCTTGCTTGCCGAGCAGAATCTTCCACTTTCCGACCAGCAAAAAGAACAAATTT  
GAACGTTATTTTGGAGCTCTTGGTTCGAGTGGAATGAGAAGATTAAATTTGACGGCGATTACGGACAAGGAAGAAGTT  
TATCTCAAACATTTTACGATTTCGATTGCACCCATTCTTCAAGGTTTGGATTCCCAATGAAACTATCAAACCTTCTTGA  
TATCGGGGCTGGGGCAGGATTTCTAGTCTACCAATGAAAAATCTCTATCCGGAGTTAGATGTGACCAATTATTGAT  
TCACTCAATAAGCGCATCAACTTCTACAACTCTTGGCTCAAGAACTGGATTTGAACGGAGTTCAATTTCTACCAAG  
GACGTGCCGAAGATTTTGCCCAAGACAAGAACTTCCGTGCTCAATATGATTTTGTAAACAGCTCGTGGCGTTGCCCG  
15 TATGCAGGTCTATCTGAATTGACTATCCCTACCTTAAGGTTGGTGGCAAACTATTAGCACTCAAGGCTAGCAAT  
GCGCTGGAGGAATTATTAGAAGCTAAGAAATGCCCTCAATCTCCTTTTATGAAGGTGGAAGACAATCTCAGGCAAG  
CCCTACCGAATAGAGATCCGCGCTATATCACAGTGGTAGAAAAGAAAAAGAAACACCAAAATAATATCCACGTA  
AGGCTGGTATGCCAAATAAACGCCCACTTTAA

4179.6  
20 ATGAGTATTAATACTAATTGCCGTTGATATCGACGGAACCCCTTGTCACAGCCAAAAGGAAATCACTCCTGAAAGTTT  
TTTCTGCCATCCAAGATGCCAAGAAGCTGGTCAAGTCTGATTGCAACTGGCCGCTATCCGAGGCGTTGCG  
CAAACTTCTAGACGACTTGCAGTTGAGAGACGAGGGGACTATGTGGTAACCTTCAACGGTGGCCTTGTCCAAAGA  
AACTGCTACAGGACATGAGATTATCAGCGAATCCTTGACTTATGAGGATTATCTAGATATGGAATTCCTCAGTCGC  
AAGCTCGGTGCCACATGCATGCCATTACCAAGGACGGTATCTATACTGCAAAATCGCAATATCGGAAAAATACACT  
25 GTACACGAATCAACCCCTCGTCAGCATGCTATCTTCTACCGTACCCCTGAAGAAATGGCTGGCAAGAAATTTGTTA  
AATGTATGTTTATCGATGAACAGAAATCTCGATGCTGCGATTGAAAAAATTCAGCAGAAATTTACGAGCGCTA  
CTCCATCAACAAATCTGCTCCTTTCTACCTCGAACTCCTTAAAAAGAAATGTAGACAAGGGTTACGCCATTACTCAC  
TTGGCTGAAAAACTCGGATTGACCAAGATGAACCATGGCAATCGGTGATGAAGAAAATGACCGTGCCATGCTG  
30 GAAGTCTGTGGAAACCCCGTTGTCATGGAAAAATGGAAATCCAGAAATCAAAAAAATCGCCAAATACATACCCAA  
ACAAATGACGAATCCGGCGTTGCCATGCCATCCGAACATGGGTACTGTA

4179.7  
35 ATGACTTGGATTATCTTGGAGTTATCGCTCTTATTGTTATTTTGTGATTGTTAGCTATAACGGTTTGGTTAAAAA  
TCGTATGCAAAACCAAGGAGGCTTGGAGTCAGATTGATGTTTCAAGTGAACGTCGCAATGACCTCTTGCCAAACTTG  
ATTGAGACTGTAAAAGGTTATGCCAAATATGAAGGTTTACCTTGAAGAGGTGCGAGAACTACGTAACCAAGTG  
GCGGCAGCGACTTACCAGCAGAAAGCTATGAAAGCCAGTGATGCCCTCACTCGTCAGGTTTCAAGTATTTTGCAG  
TTGCAGAAAGCTATCCAGATTGAAAGCTAGTGCTAACTTTGTTAAATGCAAGAGGAGTTGACAAACACAGAAA  
ATAAAATTTCTTACTCTCGTCAACTCTATAACAGTGTGTCAGCAACTACAATGTAAAATTAGAACTTTCCCGAG  
40 CAATATTATCGCTGGAATGTTTGGATTAAAGCGGCAGATTTCCTTCAACACCTGAAGAGGAAAAGTTCGGTTCT  
AAAGTTGATTTTAGCGGTTAGGTGACTAA

4179.8  
45 ATGTTGTTTGATCAAAATGCAAGCAATAAACGAAAAACCTGGATTGTTGCTGGTATTTTCTACTCTTAGCTCT  
TGTTGGTTATGCGGTTGGTTATCTCTTATAAGATCTGGACTTGGTGGTTGGTTATTGCACTGATTATCGGCTTTA  
TCTACGCTTTGTCTATGATTTTCAATCGACAGAGATTGTCATGTCCATGAATGGAGCGCGTGAGGTGGATGAGCA  
AACGGCACCAGACCTTACCATGTAGTGGAAGATATGGCTCTGGTCTGATTCCTATGCCCGGTTTTCATC  
ATTGATGATCCAGCCTTAAATGCTTTGCGACAGGTTCTAATCCTCAAAATGCGGCTGTGCTGCGACTTCAGGTC  
TACTAGCTATCATGAATCGTGAAGAACTAGAAGCTGTTATGGGACATGAAGTCAGTCATATTCGTAATTATGATAT  
50 CCGTATTTTGGACTATTGCAAGTTGCCCTTGTAGTGCTATCACCATGCTTTCTAGTATGGCAGGTGCTATGATGTGGT  
GGGGTGGAGCAGGTGCGACAGCAAGTGATGATGACCGAGATGGAATGGTCTTGAATCATTATGCTAGTGTTTT  
CCCTACTAGCTATTGTACTGGCACCTCTCGCTGCAACCTTGGTTTCAGCTCGCTATTTCTCGTCAGAGGGAATTTCTG  
GCAGATGCATCTAGTGTGAGCTGACTCGCAATCCCGAGGAATGATTAATGCCCTAGATAAGTTGGACAATAGC  
AAACCTATGAGTCGCCACGTGATGATGCTACGAGTGCCTTTATATCAATGATCCTAAGAAAGGTGGGGGTTCT  
55 CAAAACTCTTTTATACCCACCCACCTATCTCAGAACGGATTGAACGTTTAAAAACAGATGTAA

4179.9  
60 ATGAAATTAATAATTCAAGAAATTCGTAAGCAGTCTGAAGGTTTGAACCTTTGAACAAACGTTAGATTAGTTGATG  
ACCTGCGTGACGTAATCAAGAAATTTAGATGTAAGAAAGATACCTTGCAGTTGGGAAAGTACAATATGAAGACC  
GTATGATTTTCTAGATTATCAACTATCTTATACCATTTGTTCTTGGTTCGAGTCGAGTATGGAGCCAGTTAGTTA  
GTTGAATCTTATCCAGTCACGGAAGTTTTCATGGAAGGCGCAACTAACAGCTAGATCAAGAAAGTTTATGATGATG  
ACTTGGTCTTGCCATCGAAAATGGGAGCTTGACCTTGTGAGAGTGATCAGACAATATCTGCTAAACATTCC  
TATCAAGGTCTTGACGGCTGAAGAAGAAAGCTGGTCAAGGATTTATCTCAGGAAATGACTGGCAATCATGACAGA  
65 GGAAGAATACCAAGCTCAAAAAGCAGTAAAGAAAGAAAGAAACAGTCCTTTTGTGGCTTACAAGGACTATTTGA  
CGGAGATGAATAA

4179.12  
ATGGAGTTATTTATGAAAATCACAACTATGAAATCTATAAGTTAAAAAATCAGGTTTGACCAATCAACAGATT  
TGAAGTGTCTAGAATACGGTGAAAAATGTTGATCAGGAGCTTTTGTGGGTGATATTGCAGATATCTCAGGTTGCCG  
5 TAATCCAGCCGTTTTATGGAACGTTATTTTCAGATAGACGATGCGCATTGTGCGAAAGAGTTTCAAAAATTTCCA  
TCTTTCTCTATTTTAGATGACTGTTATCCTTGGGATTTGAGTGAAATATATGATGCCCTGTACTTTATTTTACAA  
GGGAAATCTTGACCTCCTGAAATTCCTCGAAGGTAGCGGTCTGGGCAGTCTGCTTGTAGCAACAGGGAGCTAA  
GTCAGTTGAAAAAGTCATTCAAGGCTTGGAAAAATGAACTGGTTATTGTCACTGGTCTGGCCAAAGGGCATTGACAC  
AGCAGCTCATATGGCAGCTCTTCAGAATGGCGGAAAAACCATTGCAGTGATTGGAACAGGACTGGATGTGTTTA  
10 TCCTAAAGCCAATAAACGCTTGCAAGACTACATCGGCAATGACCATCTGGTTCTAAGTGAATATGGACCTGGTGA  
ACAACCTCTGAAATTTTCATTTTCTGCCGTAACTCGCATCTTGTCTGAGCTTTGTCTGGTGTGATTGTAGCAGAG  
GCTAAGATGCGTTAGGTAGTCTCATTACGTGTGAGCGAGCAATGGAAGAAGGACGCGATGTCTTTGCTATTCTCTG  
GTAGCATTTTAGATGGACTATCAGACGGTTGCCATCAITTGATTCAAGAAGGAGCAAAATGGTCAACAGTGGGC  
AAGATGTTCTTGGGAATTTGAATTTAA

4181.1  
ATGAAACGTCAAATTAGCCTTGGTCTCTTTAGTGGTGGTCAAGATTCAACAACCTGCCTTTTCTGGGTCTGCAAC  
ACTATGAAACAGTCGAAGCTGTCACTTTGCCTACGGCCAAAGTCATCACTCGAAATTCAAATTAAGAGAAAT  
CGCTAAGGAACAGGGCATTCTGCACCATATCCTCGATATGTCTCTGCTGGGACAAATCACTGCTCAGCCAGACTTT  
20 GCGACGATTCTATTTCTACATTCCTGACAAGCTCTGTGTGAGTCAAAATCCCTCAAACTATATCTATTTAGCT  
ACCGAAACACGGAGATTTCCACGAAAACTGTATCAACACCATCGGAAAGACTTGGTCAACTTGTAGACCTCTC  
GCTATTTAGAGTCTGGGAAAAATTCACCTCGCGCGGTGGCATTTCATCGACCCCTACTACAACCTAGCGTAAGCA  
AGGAACTAAGTATGAGGGCTTGGCAGAACACGCTCTTCAACACGACCTTTATCCAGAGAAAAATGACAACCG  
CTAA

4181.2  
ATGACCGAAACGGTAGAAGATAAAGTAAATCAATTACTGGGCTTGATATCCTCAAGGGGATAGTTGCTGCG  
GGAGCTGTCTAAGTGGAACCGTTGCAACTCAACGAAGGTATTTACAAATGAGTCAGCAGTACTTGAAAAAACT  
GTAGAGAAAAAGGATGCTTTGGCAACAAATGATACAGTATGTTCTAGGTACGATATCTACAAGTAAATCAGCGAGT  
30 TCAACTAGTTTGTCTAGCTTCAGAGTCGGCAAGTACATCTGCATCTGAGTCAGCCTCAACAGCGCTTCGACCTCAG  
CAAGTACAAGTGATCAGAATCAGCAAGTACATCGGCTTCGACAAGTATTTCTGCATCATCTACTGTGGTAGGTTT  
ACAAAAGCTGCCGTACAGAAGCAACTGCTAAGAAAGTCAAGAGATCGTAAGAAACAGCTAGTGAATTATGT  
AGCATCAGTTACAAATGTCAATCTCCAATCTTATGCTAAGCGACGCAAGCGTTCACTGGATTCCATCGAGCAATTG  
CTGGCTTCTATAAAAAATGCTGCTGTTTTCTGGCAATACGATTGTAATGGCGCCCTGCAATTAATGCAAGTC  
35 TAAACATTGCTAAAAAGTGAGACAAAAGTTTATACAGGTGAAGGTGTAGATTGCTATATCGTGTTCCAATTTACTA  
TAAATTGAAAGTGACAAATGATGGTTCAAAATGACCTTTACCTATACGTTACGTATGTGAATCCTAAAAACAAAT  
GATCTTGGTAATATATCAAGTATGCGTCTGGATATTCTATCTATAATTCAGGTACTTCAACACAAACAAATGTTAA  
CCCTTGGCAGTGATCTTGGTAAACCTTCAGGTGTAAAGAACTACATTACTGACAAAAATGGTAGACAGGTTCTATC  
CTATAATACATCTACAATGACGACGCAAGGTAGTGGTATACCTTGGGAAATGGTGGCCAAATGAATGGTTTCTTT  
40 GCTAAGAAAGGATATGGATTAAATCATCTTGGACTGTACCAATTAAGTGAACGGA  
TACATCTTTACATTTACCCCTTACGCTGCTAGAACAGATAGAATTGGAATTAAGTACTTCAATGGTGGAGGAAAG  
GTAGTTGAATCTAGCAGCAGCAGTCAGTCACTTTCAGTCTAAGTCACTCTCAGTAAGTGCTAGTCAAAAGCGCCT  
AGCTTCAGCATCAACAAGTGGCTCGGCTTCAGCATCAACCAAGTGCCTCGGCTTCAGCGTCAACCAAGTGGCTCAG  
CTTCAGCAAGTACCAAGTGTCTCAGTCTCAGCATCAACAAGTGTCTCAGCCTCAGCATCGACAAGTGCCTCGGCTC  
45 AGCAAGCACATCAGCATCTGAATCAGCGTCAACCAAGTGTCTCGGCTTCAGCAAGTACCAAGTGTCTCAGCTTCAGC  
ATCAACCAAGCGCCTCGGCTTCAGCAAGCACCTCAGCTTCTGAATCGGCTCAACCAAGCGCCTCGGCTTCAGCAAG  
CACCTCAGCTTCTGAATCGGCTCAACCAAGCGCCTCAGCTTCAGCATCAACCAAGTGTCTCGGCTTCAGCAAGCAC  
AAGCGCCTCGGCTTCAGCATCAACCAAGTACGTACGCTTCAGCGTCAACCAAGTGTCTCAGCTTCAGCATCAACAAG  
TGGTTCAGCCTCAGCAAGTATCTCAGCGTCTGAATCGGCTCAACCAAGTGTCTGAGTCAGCATCAACCAAGTATC  
50 GTCAGCCTCAGCAAGCACCTCAGCTTCTGAATCGGCTCAACCAAGTGTCTCAGCTTCAGCATCGACAAGCGCCTC  
AGCTTCAGCAAGTACCAAGTGTCTCAGCTTCAGCGTTCGACAAGTGTCTCGGCTCAACCAAGTGTCTGAAATCGGC  
ATCAACCAAGTGTCTCAGCTTCAGCAAGTACTAGTGCATCGGCTTCAGCATCAACCAAGTGTCTCGGCTTCAGCTTC  
ACCAAGTGTCTCAGCTTCAGCAAGTACCAAGTGTCTCAGCTTCAGCATCAACAAGTGTCTCAGCTTCAGCATCGACA  
AGTGCCTCGGCTTCAGCAAGCACATCAGCATCTGAATCAGCGTTCGACAAGCGCCTCAGCTTCAGCAAGTACCAAGT  
55 GCGTCAGCTTCAGCATCAACCAAGCGCCTCGGCTTCAGCAAGCACCTCAGCTTCTGAATCGGCTCAACCAAGCGCC  
TCGGCTTCAGCAAGCACCTCAGCTTCTGAATCGGCTCAACCAAGCGCCTCAGCTTCAGCATCAACCAAGTGTCTCG  
GCTTCAGCAAGCACAAAGCGCCTCGGCTTCAGCATCAACCAAGTACGTACGCTTCAGCTTCAGCTTCAGCTTCAGCC  
TCAGCATCAACAAGTGTCTCAGCTTCAGCAAGTATCTCAGCGTCTGAATCGGCTCAACCAAGTGTCTGAGTCA  
GCATCAACCAAGTACGTACGCTTCAGCAAGCACCTCAGCTTCTGAATCGGCTCAACCAAGTGTCTCAGCTTCAGCA  
TGCACAAGCGCCTCAGCTTCAGCAAGTACCAAGTGTCTCAGCTTCAGCTTCAGCTTCAGCTTCAGCTTCAGCTTCAG  
60 CATCTGAATCGGCTCAACCAAGTGTCTCAGCTTCAGCAAGTACTAGTGCATCAGCTTCAGCATCAACCAAGTGCAT  
CGGCTTCAGCATCAACCAAGTGTCTCGGCTTCAGCTTCAGCTTCAGCTTCAGCTTCAGCTTCAGCTTCAGCTTCAGT  
CTCAGCATCAACAAGTGTCTCAGCTTCAGCATCGACAAGTGCCTCGGCTTCAGCAAGCACATCAGCATCTGAATCA  
GCGTTCGACAAGCGCTCAGCTTCAGCAAGTACCAAGTGTCTCAGCTTCAGCTTCAGCTTCAGCTTCAGCTTCAGCA  
AGTACTAGTGCATCAGCTTCAGCATCAACCAAGTGTCTCGGCTTCAGCTTCAGCTTCAGCTTCAGCTTCAGCAAGT  
65 ACCAGTGTCTCAGCTTCAGCATCAACAAGTGTCTCGGCTTCAGCAAGCACCAAGTGTCTCGGCTTCAGCAAGTACT

AGCGCCTCAGCCTCAGCCTCAACCAGTGCCTCAGCCTCAGCAAGTATCTCAGCGTCTGAATCGGCATCAACGAGT  
GCGTCCGCTTCAGCAAGTACTAGCGCCTCAGCCTCAGCGTCAACAAGTGCATCGGCTTCAGCGTCAACGAGTGC  
TCTGAATCGGCATCAACGAGTGCCTCGGCTTCAGCAAGTACTAGCGCCTCAGCCTCAGCGTCAACAAGTGCATCG  
GCTTCAGCATCAACGAGTGCCTCGGCTTCAGCAAGTACTAGCGCCTCAGCCTCAGCGTCAACAAGTGCATCGGCT  
5 CAGCGTCAACGAGTGCCTCTGAGTCAGCATCAACGAGTGCCTCAGCCTCAGCAAGCACATCAGCTTCTGAATCTG  
CATCAACCAGTGCCTCAGCCTCAGCATCGACAAGCGCCTCAGCTTCAGCAAGTACCAGTGCCTCAGCCTCAGCGT  
CGACAAGTGCCTCGGCTTCAGCAAGTACCAGTGCCTCAGCCTCAGCAAGTACCAGTGCCTCAGCCTCAGCGTCA  
CAAGTGCCTCGGCTCAACCAGTGCATCTGAATCGGCATCAACCAGTGCCTCAGCCTCAGCAAGTACTAGTGCAT  
10 CAGCTTCAGCATCAACGAGTGCATCGGCTTCAGCATCAACCAGTGCATCAGAGTCAAGTACCAGTGCCTCAG  
TTCGCATCAACAAGTGCCTCGGCTTCAGCAAGTACTAG

4183.1  
ATGGGGGTCGAAACTTGGTTTTATTCTAGCATCTGCTGGCTGGCCATCGGGCTTGGTTCCGTTTGGAAAGTTCCCT  
ACATGACTGCTGCTAATGGCGGTGGAGGCTTTTTACTAATCTTTCTATTCCACTATTTAATCGGTTTCCCTCTC  
15 CTGCTGGGTGAGTTTGGCCTTGGCGGTAGTGTGGCGTTTCCGCTATCAAAACCTTTGGAAAACTGGGCAAGAATA  
ACAAGTACAACCTTATCGGTTGGATTGGCGCTTGGCCTCTTATCTCTTATCTTTTACAGTGTATCGGAGGA  
TGGATTCTAGTCTATCTAGGTATTGAGTTTGGGAAATTGTTCCAACTTGGTGGAAACGGGTGATTATGCTCAGTTAT  
TTACTTCAATCATTTCAAATCCAGCCATTGCCCTAGGAGCTCAAGCGGCCCTTATCCTATTGAATATCTTCAITGTA  
TCACGTGGGGTTCAAAAAGGGATTGAAAGAGCTTCGAAAGTCAATGATGCCCCCTGCTCTTATCGTCTTGTTTTTA  
20 TCATCGGTGCTCTCTCAGTTTGCCTCAATGCCATGGAAGGGGTTCTTACTTCTCAAAACGAGACTTTTCAAACT  
GACTAGCACTGGTCTCCTCTATGCTCTGGGACAATCTTTCTTGGCCTCTCACTAGGGGTACAGTCAATGTTGACCT  
ATGCTTCTTACTTAGACAAGAAAACCAATCTAGTCCAGTCAAGGAATCTCCATCGTAGCCATGAATATCTCGATATC  
CATCATGGCAGGTCTAGCCATTTTCAAGCTCGATCCCCCTTCAATATCCAGTCTGAAGGGGGACCCAGCCTGCTC  
TTTATCGTCTTGGCTCAACTCTTTGACAAGATGCCTTTTGGAAACCTTTCTACGCTCTTCTCTTGTCTTCTCTT  
25 TTTGGCAGCTCACTTTTCTGCTGATGCTGGAATCAATGTAGACAATATCACCACAGGATAACAGCAAAAC  
GTGCCAAATGGAGTGTATTATAGGAATTTGACCTTTGCTTTGGCATTCTTTCAGCCCTATCTTACGGTGTCTG  
GCGGATGTTCACTTTTGGTAAGACCTTCTTTGACGCTATGGACTTCTGTTTCCAATCTCCTCATGCTTGG  
AGCTCTCTACCTTCACTTTTACAGGCTATATCTTTAAAGGCTCTTGGCAATGGAGGAACTCCATCTCGATGAA  
30 AGAGCATGGAACAAGGACTGTTCCAAAGTCTGGCTCTTCTCTTCTGTTTCTGTTTCTGTCATTCCAATCATCATC  
ATTGTGGTCTTCAATGCCCAATTTATGTAATCAAAAAGGACTTGAAGTAG

4183.5  
ATGTTGAAAAAATGGCAGTTAAAAGATGTTATCTTGCTTGCTTCTTGTCTATCTTTTGGTGGGGTTTTCGTTGG  
TTCAGGATATGTTGATAAATATTCTCAGTCTACTCTTAACACCTCTTGGTTTGCAGGCCTTTGCAATGAAATCCTCT  
35 TCGGTCTCTGGTGTATGGCTGCGCCATTTGCTGCCATCTTGTTCGAGAGTGGGAAGTCAACGATTGGAGAAGT  
GCTAGCTGCGCTTCTGTAAGTCTTTATGTTAGCAATTTGGTCTAGGAGCTCTTTGTCTGGCTTTGTTCAAGGTT  
TGGGAAGTGAATTTGGTTTATCGTAACAAAGATCGCTATGAAAGTTGGCTCTCTTAAGTCTAATAGTATTGG  
GATTACGCTTGTAGCTTTGTCTATGAATACATTAAGTTAGGTTACTACGCTTTTCCCTTCCGTTTGTCTTCTCT  
40 GCTTGTGGTACGTTTATTTCTGTTATTTCTCTGTACCATCTTGGTTCGTGCCATTGTCAAACCTCTATCATCAGTT  
TGCAACTGGAGGAAAAGCATAG

4183.6  
ATGGTCAAAGTAGCAACCCAGACCCGATTATCAGTCTCTTCTTGTCTATTTATCCTTGGAAACATCTTTCATTCC  
TTCGATTGCTCTGACTCTTTCGGTAGTCGATTTTGTATTCTCTTATGCTCTATTACCGTCGATTTAAAATGTTAG  
45 CTGGATGATCATACTTGCCATTTTACCATCTTTTGCCAACTACTGGGCAGTTCAGTTACACGGAGATGCTTCACA  
GGCAGTCACTGCTTGAACGAGGGCCTTTGTGACAGTTTGTATCGGCCTTGTCTTGTCTCTGTTTCACTAAAAAG  
AGCTTCTCTTGTACTTGGCTCAAAAGGGGCTATCAGCTCTTGGTCTTATGCTTGTATTGTTGTTCAATTTCTTT  
CCTCTCATTACAGCAAGAAATCAAGTCCCTCAAGAAAGCTTGCCCTATTACGTGGTCAAGAACTACATTTTGGTGG  
50 CCTGTATTACAGTAAGGTTCTGATGACAGTCTTATGGTGGCGCCATCTTACCTGAGAGCTCTATCTGCTCAGGG  
ATATGACGAACATGCACAGTTGAAGAAATAGCTATCGGACTTTTATATTCTTAAAAAACAATAATCTACCTG  
CTTTCTTTTATTGCTTCAAACAGTCTATTTTATAA

4183.7  
ATGAGAAAGCACCAATTACAAGTTCACAAATTAACCATTTTATCTATGATGATTGCCCTTGATGTAGTCTTACAC  
CTATCTTTTGAATTTAGGGAATGGCACCGATGTCCAGTGTAGTCAATATTCTAGCAGGAATCATGATGGGACCTGT  
55 TTATGCCCTTGGCTATGGCTACAGTCAAGCCTTTATCCGTATGACGACTCAAGGGATTCCGCTTTAGCTCTACA  
GGAGCGACTTTTGGAGCCCTTCTAGCAGGTCTCTTTATAAGTACGGTCAAAAAATTTCACTATTCTGCTTAGGAG  
AGATTTTGGGAACAGGTATTATTGGTTCCATTGTTTCTATCTGTTATGGTACTCTTTACAGGATCAGTCTGAAG  
60 CTTAGCTGGTTTATCTACAGCCTCGATTTTTCGGAGCAACCTTGATTGGTACAGCGATTTCCTTTATTGCCCTTTCG  
ATTTTTAATCAAGCAGGAATTTCTTAAAAAAGTGCAGGGATTTTCTTATGTAAGGATAGACTGA

4183.8  
ATGCAGGAATTTACAAATCCCTTCTATAGGCTCTAGTTCCTCATTCAGTCAATTACCAATGAGATTCTTGTGA  
GATGCTGGCAATGGGATTTTGGCTCTGGGATGCAAACTGTATGGCAGATGATTCCCGTGAAGTTCTTGATTTT  
65 ACTAAGCAAAGTCAGGCTCTCTCATCAATTTGGGGCATTTGTGAGTGAAGGAAAAAGCAATCCGCATGGCA

5 GCTTCGTATGCAAAACCAATCTTCTCTCCCGATGGTAGTAGATGCGGTTGGCGTAACGACTTCATCCATTGTAAGA  
GCTTAGTTAAAGACCTTTTAGACTATAGACCTACGGTCCTTAAAGGAAACATGTCAGAAATTCGAAGTCTTGTGG  
ATTAAGCACCACGGCGTTGGGGTCGATGCGAGTCTAAAGATCAAGAAACGGAGGATTGCTTCAAGTCTTGAA  
AGACTGGTGTGACACCTATCCTGGTATGTCTTTCTAGTCACAGGTCCCAAGGACCTCGTCGTTTCGAAAAATCAG  
GTCGCTGTACTGGGAAATGGCTGTACTGAATTAGACTGGATAACAGGGACAGGAGACTTGGTTGGAGCCTTAACA  
GCTGTTTTCTCAGCCAAGGAAAGACTGGTTTTGAAGCTTCTTGGCTTAGCAGTCTCTTATCTCAATATCGCTGCTGA  
GAAAAATAGTTGTTCAAGGAATGGGATTGGAAGAATTTGTTACCAAGTACTCAATCAGCTTTCGCTCCTAAGAAG  
AGATGAAAAATTGGCTAGATACCATCAAAGGAGAGGTTTATGAATAG

10

4185.3  
15 ATGAACCATAAAATCGCAATTTTATCAGATGTTTCATGGCAATGCGACGGCGCTAGAAGCAGTGATTGCAGATGCT  
AAAAATCAAGGGGCCAGTGAATATTGGCTTCTGGGAGATATTTTCTTCTGGTCCAGGGCGAAATGACTTAGTGC  
CCCTGCTAAAGGACCTTCTATCAGCAAGTGTTCGAGGCAATTGGGATGATCGTGTCTTGGAGGCTTAGATGG  
GCAATATGGCTTAGAAGACCCACAGGAAGTTCAGCTCTTGGCTATGACACAGTATTGATGGAGCGAATGGATCC  
TGCAACGATTGTCTGGCTACGAAGCTTGCCTTTGCTGGAAAAAGAAAGAAATTGACGGATTGGCTTTCTATCTCT  
20 CATAATTTACCTGACAAAACTATGGTGGTGAAGTGTCTAGTTGAGAAATGATACAGAGAAATTTGACCACTGCTA  
GATGCGGAAACGGACGTGGCAGTTTATGGTCATGTTCAACGAGTTCGCTTCTTATGGAAGTCAAGGGCAACAA  
ATCATCAATCCAGGGTCGATTGGCATGCCCTATTTTAAATTGGGAGGCGTTAAAAATCACCCTCCAGTATGCCG  
TGATAGAAGTTGAAGATGGGGAATTACTCAATATCCAATTTCTGTAAGTTGCTTATGATTACGAAGCTGAGTTAGA  
ATTGGCCAAGTCCAAGGGGCTTCCCTTTATCGAAATGTATGAAGAACTGCGTCGTGACGATAACTATCAGGGGCA  
25 CAATCTGGAATTATTAGCCAGCTTAATAGAAAAGCATGGGTATGTAGAGGATGTGAAGAATTTTTTGTATTTTTG  
TAA

4186.1  
30 ATGAATGTAAATCAGATTGTACGGATTATTCCTACTTTAAAGCTAATAATAGAAAAATTAATGAAACATTTTATA  
TTGAAACCCCTTGAATGAAGGCCTTGTAGAAGAATCGGCCCTTCTGTCACTAGGTGACCAACGGGCTTGA  
GCTGTTTTTGAAGAAGCTCCAGTATGCGTACTCGTAAGGTAGAGGGAAGAAAAAACTAGCTAGATTGATTGT  
CAAGGTGAAAAATCCCTTAGAAAATTGAAGGAATCTTATCTAAAAACAGATTGATTATATGAAAGTCA  
AAATGGCTACGCTTTTGAATTTTCTCACCAGAAAGATGATTGATTTTGATTTCATGCGGAAGATGACATAGCAAGT  
CTAGTAGAAGTAGGAGAAAAAGCCTGAATTTCAACAGATTGGCATCAATTTCTTTAAGTAAATTTGAGATTCTA  
35 TGGAAATTACATCTCCCACTGATATCGAAAGTTTCTGGAATCATCTGAAATTTGGGGCATCCCTTGATTTTATCC  
AGCTCAGGGGAGGATTGACTGTGGACAATACGGTTACCTGGGACTTATCTATGCTCAAGTTCTTGGTCAATGAA  
TTAGACATAGCAAGTCTTCGCCAGAAAGTTGAGTCTACTGAATATTTTCTTAAAGTCTGAAAAATCTTCTTG  
GTAAGATAGAAAATATGTTGAATTGTGTTTGAAGAAGTATGA

4186.2  
40 ATGAAGTGGACCAAGATTATTAATAAATAGAAACAAATCGAGGCAGGGATTTATCCCGGAGCCTCTTTTGGC  
TATTTTAAAGGACAATCAATGGACAGAGTCTATTTAGGCCAGAGTGACCCAGAGCATGGCTTGACAGCTGAGGCA  
GGACTAGTTTATGACCTAGCTAGTGTGAGCAAGGTTGTTGGGGTTGGCACAGTTTGTACCTTCTTGTGGGAAATAG  
GTCAATTAGATATTGATAGACTGGTAATAGATTTTACCTGAGAGTGATTATCCAGACATCACTATTCGCCAGCT  
45 CTGACTCATGCAACAGACCTTGATCCTTTTATCTCAATCGTGATCTTTAACAGCCCTGAATTAAGGAAGCG  
ATGTTTCATCTCAACAGACGAAGTCAGCCAGCCTTTCTTATTCGGATGTCCATTTTGTGTTGGGCTTTATTTT  
GGAAAGAATTTTAAATCAAGATTGGATGTGATTTTAAAGGATCAAGTCTGGAACCTTGGGGAATGACGGAAC  
TAAGTTTGGGCCAGTTGAGCTTGTGTTTCAACAGTTAGAGGTGTAGAGGCAGGCATAGTGCATGATCCCAAGGC  
TCGTCTCTGGGTAGACATGCTGGAGTGCTGTTTATTTTCGACTATAAAGGATTTACAAATCTTTTGAACAC  
50 TATTTAGCAGATGATTTTGAAGAGACTTAAATCAAAATTTTCTCCTTTGGATGACAAGGAACGTTCTTTAGCAT  
GGAAATTTGAAGGAGATTGGCTAGACCATACGGGCTATACAGGTACCTTTATCATGTGGAATCGTCAGAAGCAAG  
AAGCCACTATTTCTATCGAATCGTACCTATGAAAAGGACGAGAGAGCTCAATGGATATTAGACCGCAATCAAG  
TGATGAACCTTGATTGCGAAAGAAGATGA

4187.2  
55 ATGATGAAGAAGACTTATAATCATATTTTGGTCTGGGAGTCAATTTCTATAGCATTTGCATTGTCTGTTTTGCTT  
TACTCCTCAAGAACAATCTACCGTGGGAGTGGGAACCTCCAGGTATTCAGCATCTTGGACGCCTGGTTTTCTTTG  
ACTCCTTTCAATTTCTCTCTGAAACTGGCGAAGTGAGTGACATTGGACAATTATGTTGGATTTTTTACAAAAATA  
TCCTCAATGTCTTCTGTTTTTCTCTGATTTTCCAACCTCTTTATCTATTTCCAAATTTGCGGAAAAACAAAAAG  
60 GTCCCTCTTTTGTGTTTTCTGTGAGTCTTGGAAATCGAGTGTACGCAATTAATCTTGGACTTTTCTTTGATTTCAT  
CGCGTCTTTGAGATTGATGATTTGTGGACCAACACTTTGGGTGGCTATCTGGCTTGGCTCCTTTATAAACGATTAC  
ATAAAAAACAAGGTAAGGAATTA

65

4188.1

5 ATGAAGATTCTCTCTTAACCTTTTGAAGGCATAAAATTTGTTTATGCTTGCTTACTTTGCTTTTTCTGCTTTGGTT  
TATCGTGATGTTTTGATGACTTAATTCCTTTTTGATATTATGCGCCCGATCTAGCTAAATTCGATGGACAAGCAAT  
TAAAAATGACTTATTAAAAATCAGCATTAGATTTTCGTAATCTCCAGTTCAATCTAGGTTTTATCAATCATTTATTA  
10 TTCCAATCATCAATTGTTTTGCTAGGTTTTCAATATATTGAGCTGAAAAATAAAGTTTTACGATTGAGTATTGGAAG  
AGAAGTGAGTTATCAAGGTTAAAAAGAAAGTTGACTTTGCAAGTTGCAAGTATCCCTTGTTGATATATTTAGTG  
ACTGTGCTGATAATTGCAATTATAACCTATTTCTTTGGGACTTTTTCTCTCTTGGATGGAATTCCTATTTTCTGAT  
GGAAGTGGTTTTACAAAGACTCCTAGATGGAGAGATAAAAGCTATTTGTTCTTACTTGTGTCTACTAATCGGTA  
TTTTATCAATGCAATCTATTTTTTACAAATAGTTGATTATGTGGGGAATGTGACTCGTTCGGCAATCACTATTTG  
15 ATGTTTCTTTGGCTTGGTTCTATGCTGCTTATAGTGCTTGCCTTACTATATGGTTCCTATGACGAGTTTGATGCA  
AGCTAGCTATGGGGATGTAAGTTTGATGAAACTCTTACTCCTTATATCCTTTATATTGTCCCTTACATGGTGCTTG  
AAAAATATGAAGATAATGTTTAA

4188.2

15 ATGAAGATAATGTTTAAAGAATTTAACAATATTTTGTCTAAATAGAAAGATTGTTTTACTACTTCGTATAGTTCTGAT  
GATGATTTTTGATAAACCATCTATTGTCAACAGCGGTTCAAAAGCAGGATGCTGTTATCTTTTTCAAGAGAGAAATTG  
ATTTCAATTTTTCTCTATAATGACTATCTGAAGCGAATTTAGAAATCCCAAACTATTGTTAAACCTTTCCGCTTT  
20 CATGGTAGGATGGCTCTCTGTCATTTTACTGAAAGTGATTGGCAGACCATTACCATCACTTGATTGCTATCAA  
TCAAGCTCCTTTTTCGATTATACAAGGAAACGATTGGTTGTCAATTTCTAAATTTTTACTCAAGATTTGTTGTCTG  
GTTTCTTGGTTTACTTCTCTAGGAATTCATTTCAAAACAGTCGCACCTTTCTTTTTACTTGCTCAGTTAATGATGT  
GTACTTACTACTGTCTTATCTGATAGCACTGATTAGTGCGGGCGCTGGTTTTCTTTTTCTCTATTTTTAGCAAT  
TGTGGGACAAGAATGGATGATGGATCATATTGTACAGTGATTTAGTACTCTTAAGTTTATTAGTTATGTTGATT  
GTTAGTCCGTTGGAAGAGAAATTTAAGAAAGGATAA

4188.5

25 ATGGGCAAAAGGAGAGATGGGCAAAAGGAGTTATTGGCTTGGAGTTGCGACTCAGAAAGTATTGGTCAACAAGGCTCCA  
ACCTTCAATTTGGCAAAATGGTAAAAACAGCGACTTCTTAACCCAGTATGATAGCAAGACCTTGTTGTTGCAATAG  
ATAAGGAAGATATCGGACAGGAAATTTATGGTATAGCTAAAGGAAGCATCGAAAGTATGCATAATCTCTCTGTA  
30 ATCTAGCAGGTGCCAGAGTTCTTGGCGGAGTAAATGGTAGCAAAAGCAGCGGTGCATGAAGTTCCAGAATTTACAG  
GGGGAGTTAATGGTACAGAGCCAGCTGTTTATGAAATCGCAGAGTATAAGGGATCTGATTGCTGTAACTCTTAC  
TACAAAAAAGATTATACTTACAAAGCTCCTCTTGTCTCAGCAGGCACTTCTGAAACAGGAAACAGGAGAGTGA  
CCTCTAGCTTCACTAGGACTAACAGCTTTCTCTTGGTCTGTTTACGCTAGGGAAAAAGAGAGACAATAA

4188.10

35 ATGTTTAAAGTTTTACAAAAAGTTGGAAAAAGCTTTTATGTTACCTATAGCTATACTTCTGTCAGCAGGTCTACTTTT  
GGGGATTGGTGGTGCACTTTCAAAACCAACACGATAGCAACTTATCCAATACTAGACAATAGTATTTTTCAATCA  
ATATTCCAAGTAATGAGCTCTGCAAGGAGAGGTTGATTAGTAATTTGTCCTACTTCTCTGTGTGGGATTATGTA  
40 TTGGCTTAGCGAAACGAGATAAAGGAACCGCTGCGTTAGCAGGAGTAACCTGGTTACTTATGTTATGCACTCAACGA  
TCAAAGCTTTGGTAAAACTTTTTATGGCAGAAAGGATCTGCAATTGATACTGGAGTTATTGGAGCATTAGTTGTCGG  
AATAGTTGCCGTATATTTGCACAACCGATATAACAATATTCAATTACCTTCCGCTTTAGGATTCTTTGGAGGTTCA  
CGCTTCGTTCTTATGTTACATCGTTCTCTTCTATCTTGATTGGCTTTGCTCTTTGTTATTTGGCCACCTTTCCA  
CAACTTCTTGTCTACAGTGGATATATTTCTCAGGCGGGTCCAATTGGAACCTTTCTATATGGATTTTAATGAG  
45 ACTTCTGGAGCAGTAGGCTTACATCATATAATTTACCCTATGTTTTGGTATACTGAACTTGGTGGTGTGAAACTG  
TTGCAAGACAAAACAGTGGTTGGAGCTCAAAAAATATTTTTGCTCAATTAGCCGATTGGCCCACTTCTGGATTATT  
TACAGAAGGAACAAGGTTTTTGCAGGTGCTTTCTCAACAATGATGTTCCGTTTACCGGCTGCTGTTTACCGATG  
TACCATAGTGTTCTCTAAAAATCGTCTGTAATAATACCGGGTTGTTTTTGGAGTTGCTTTAACATCTTTATTAC  
CGGTATTACAGAACCAATTGAATTTATGTTTCTATTCTGTCAGTCCGGTTCTATATGTTGTTACCGCATTCCTTGATG  
50 GTGTTAGCTTCTTTATTGCAGACGCTTTAAATATTTCAATAGGAAACACATTTTCAGGAGGTGTAATCGATTCTACT  
TTATTTGGAATTTTGCAGGGAAACGCTAAGACGAATTTGGGTTCTTCAGATTCCATTGGACTTATTGGAGTGTGTT  
GTATTATATTATTTTAGATGGTTCAATTAATCAACGTTCTAACGCCAGGGCGAGGAGAAGAGTAGATTCT  
AAAGAAATTTCTGAATCCGCAGATTCAACTTCAAAATCTGCAGATTATTTAAACAGGATAGCCTACAAATTAATCA  
GAGCCTTGGGTGGATCAAAATAATATAGAAGATGTAGATGCTTGTGTGACACGTTTACGTGTAGCTGTAAAAAGAA  
55 TTAATCAAGTTGATAAAGCACTTTTAAACAAATTTGGTGCAGTTGATGCTTAGAAGTGAAGGGTGGCATTCAAGC  
AATCTATGGAGCAAAAGCAATCTATATAAAAAATAGTATTAAATGAAATTTTAGGTGTAGATGATTAA

4188.11

60 ATGAAATTTAGAAAATTAGCTTGTACAGTACTTGGGGTGCTGCGGTTCTTGGTCTTGCTGCTTGCGCAATCTG  
GCGGAAGTAAAGATGCTGCCAAATCAGGTGGTGACGGTGCCAAAAACAGAAATCACTTGGTGGGCAATCCAGTAT  
TTACCAAGAAAAAAGCTGGTGACGGTGTGGAACTTATGAAAAATCAATCATCGAAGCGTTTGAAGAAAGCAAAAC  
65 CAGATATAAAAGTGAAATTGGAACCAATCGACTTCAAGTCAGGTCCTGAAAAATCACAACAGCCATCGAAGCAG  
GAACAGCTCCAGACGTACTCTTGTATGCACAGGACGTATCATCCAATACGGTAAAAACGGTAAATTTGGCTGAGT  
TGAATGACCTTTCACAGATGAATTTGTTAAAGATGTCAACAATGAAAAACATCGTACAAGCAAGTAAAGCTGGAG  
ACAAGGCTTATATGTATCCGATTAGTTCTGCCCAATTCTACATGGCAATGAACAAGAAAATGTTAGAAGATGCTGG  
AGTAGCAAACTTGTAAAAAGAGGTTGGACAACCTGATTGTTTTGAAAAAGTATTGAAAGCACTTAAAGACAAGGG  
TTACACACCAGGTTCAATTGTTCAAGTTCTGGTCAAGGGGAGACCAAGGAACAGTGCCTTTATCTCTAACCTTTAT

AGCGGTTCTGTAACAGATGAAAAAGTTAGCAAAATATACAACCTGATGATCCTAAATTCGTCAAAGGCTCTGAAAA  
 GCAACTAGCTGGATTAAAGACAATTTGATCAATAATGGTTCACAATTTGACGGTGGGGCAGATATCCAAAACCTT  
 GCCAACGGTCAAACATCTTACACAATCCTTTGGGCACCAGCTCAAAATGGTATCCAAGCTAAACCTTTAGAAAGCA  
 5 AGTAAGGTAGAAAGTGGTAGAAGTACCATTCCCATCAGACGAAGGTAAGCCAGCTCTTGAGTACCTTGTAAACGGG  
 TTTGCAGTATTCAACAATAAAGACGACAAGAAAGTCGCTGCATCTAAGAAATTCATCCAGTTTATCGCAGATGAC  
 AAGGAGTGGGGACCTAAAGACGTAGTTCTGACAGGTGCTTTCCAGTCCGTACTTCATTGGAAAACTTTATGAAG  
 ACAAACGGCATGGAAACAATCAGCGGCTGGACTCAATACTACTCACCATACTACAACACTATTGATGGATTGCTG  
 10 AAATGAGAACACTTTGGTTCCCAATGTTGCAATCTGTATCAAAATGGTGACGAAAAACCAGCAGATGCTTTGAAAG  
 CCTCACTGAAAAAGCGAACGAAACAATCAAAAAGCTATGAAACAATAG

4188.12

ATGCAATCTACAGAAAAAAACCATTAAACAGCCTTTACTGTTATTTCAACAATCATTTTGCTCTTGTGACTGTGC  
 TGTTCATCTTTCCATTCTACTGGATTTTGACAGGGGCATTCAAAATCACAACCTGTACAAATTTGTTATTCTCCTCAG  
 TGGTTCCCTAAAAATGCCAACCATGGAAAACTTCCAACAATCATGGTGCAAGCCCTGCCTTGCATGGATGGTG  
 15 AACTCAGTATTTATCTCATTGGTAACCATGTTCTTAGTTTGTGCAACCTCATCTAGCAGGTTATGTTATGGCTAA  
 AAAACGTTTCTATGGTCAACGCACTTCTATTGCTATCTTTATCGCTGCTATGGCCTTCCAAAACAAGTTGTCTTG  
 TACCATTGGTAGCTATCGTCAACTTCATGGGAATCCATGATACTCTCTGGGCAGTTATCTTGCTTTGATTGGATG  
 GCCATTCCGTTGCTCTCCTCATGAAACAGTTCAAGTGAATAATCCCTACAGAGTTGCTTGAATCAGCTAAATCGAC  
 20 GGTGTGGTGAGATTCTGACCTTCTGGAGTGTAGCCTTCCGATTGTGAAACCAGGGTTTGCAGCCCTTGAATCT  
 TTACCTTCATCAATACTTGAATGACTACTTCATGCAATTTGGTAATGTTGACTTCACGTAACAAATTTGACCATCTCA  
 CTTGGGGTTGCGACCATGCAGGCTGAAATGGCAACCACTATGGTTGATTATGGCAGGAGCTGCCCTTGTCTGTG  
 TTCCAATCGTCACAGTCTTCTAGTCTTCCAAAATCCTTCACACAGGGTATTACTATGGGAGCGGTCAAAGGATA  
 A

4191.1

ATGAAAAAACTTTTTTCTTACTGGTGTAGGCTTGTTCCTTCTCCACTCTCTGTTTTGCCATTGATTTCAG  
 ATAACTCTTATCAAGGGGATTTGTATATTCATGACAGACAATACGGCAGAGTTTAGACAGAAAGATAGTTACCAGT  
 TTGAGGAGGACTTTAAGGGCCAAATCGTGGGACTTGGACGTGCTGGTAAGATGCCTAGCGGGTTGACATTGACC  
 30 CTCATCCAAAGATTAGGGCCGCAAAAACGGTGCAAGCTAGCAGATGTGACTAGCGAAGTAACAGAAAGAGCG  
 GATGGTTATCTGTGAGAGTCTATAATCCAGGTGAGGAGGCGACATAGTTGAAGTTGACCTCGTCTGGAACTTA  
 AAAAAATTTACTTTTCTTTATGATGATATCGCTGAATTAATTTGGCAACCTCTGACAGATAGTTACAGAGTCTATTG  
 AAAAGTTTGAATTTTCATGTAAGGGGAGACAAGGGGCTGAAAAACTCTTTTCCATACAGGGAACTTTTATAGAG  
 AGGGAACGATTGAAAAGAGTAACCTTGATTATACTATCCGTTTAGACAATCTTCCGGCTAAGCGTGGAGTTGAGTT  
 35 GCATGCCTATTGGCTCGGACCGATTTTGTAGCGCTAGGGATCAGGGATTGAAAGGGAATCGTTTAGAAGAGTTT  
 AATAAGATAGAAGACTCGATTGTTAGAGAAAAAGATCAGAGTAAACAACCTCGTTACTTGGGTCTCCCTCTGATC  
 CTTTCCATCTCCTTGTATTGAGTGTCTGCTTCTATTTATTTATAGAAGAAAGACCACTCCTTCAGTCAAAATATGC  
 CAAAAATCATTGCTCTATGAACCACCAATGGAATTAGAGCTATGGTTTTATCAGAAGCAGTCTACTCGACCTCC  
 TTGGAGGAAGTGAGTCCCTTGGTCAAGGGAGCTGAAAAATCACCTTTGATCAACTATTCAAGCTACCTTGCTAG  
 40 ATGTGATAGACCGTGGAATGTCTCTATCTATTTAGAAAGGAGATGCAAGTTGGTTTGAAGCTAGTAAAAGAAAGATG  
 GTTGTCAAGCTTTGAGAAAGACTGCCTAAATCTAGCTTTTTCAGGTAAGAAAGAAAGAACTCTTTCCAATTTGTT  
 TGCGGATTACAAGGTATCTGATAGTCTTTATCGTAGAGCCAAAGTTTCTGATGAAAAACGGATTCAAGCAAGAGG  
 GCTTCAACTCAAATCTTCTTTTGAAGAGGTATTGAACAGATGCAAGAAGGAGTGAGAAAAACGAGTTTCTTCTTG  
 45 GGGCTCCAGATTATTATCGTCTTTAACTGGTGGGAAAAAGGCTTGAAGTGGGTATGGGTGCTTGAATATCC  
 TGCCCTATTTATCGGATTTGGTTTGTCTTGTACAGTTTATAGAGTTTATGGCTATCTTTACCTCCCTTTGCCAATA  
 CTTGGTTTTCTAGGGTAGTTTTGTCTGTTTTCTATTATGGAAGCTTCGACTAGATAATCGTGATGGTGTCTAAA  
 TGAAGCGGGAGCTGAGGTCTACTATCTCTGGACCAAGTTTGAATAATGTTGCGTGAGATTGCAAGATTGGATCAG  
 50 GCTGAACCTGGAAGTATTGTGCTGGAATCGCCTCTTGGTCTATGCGACCTATTGGCTATGCGGACAAGGTTA  
 GTCATTTGATGAAGGTTTCATCAGATTCAAGTGGAAAAATCCAGATATCAATCTCTATGTAGCTTATGGCTGGCAG  
 TACGTTTTATCATTCAACAGCACAAATGAGCCATTATGCTAGTGTGCGAAATACAGCAAGCACCTACTCTGTATCT  
 TCTGGAAGTGAAGTTCTGGTGGTGGCTTCTCTGGAGGCGGAGGTGGCGGCAGTATCGGTGCTTTTAA

4191.2

ATGAAAAAAGTAAGAAAGATATTTTCAAGGGCAGTTGCAGGACTGTGCTGTATATCTCAGTTGACAGCTTTTTCTT  
 CGATAGTTGCTTTAGCAGAAACGCTGAAACCAAGTCCAGCGATAGGAAAAAGTATGATTAAAGGAGACAGGCGAAG  
 55 GAGGAGCGCTTCTAGGAGATGCCGTCTTTGAGTTGAAAAACAATACGGATGGCACAACCTGTTTCGAAAGGACAG  
 AGGCGCAACAGGAGAAGCGATATTTTCAACATAAAACCTGGGACATACACCTTGACAGAAGCCCAACCTCCAG  
 TTGGTTATAAACCTCTACTAAACAATGGACTGTTGAAGTTGAGAAGAATGGTCGGACGACTGTCCAAGGTGAAC  
 AGGTGAAAAATCGAGAAGAGGCTCTATCTGACCAATCCACAAACAGGGAATTCAGATGTTCAAAACACCTT  
 60 ATCAGATTATTAAGGTAGATGTTTCGGAAGAAAAACGGACAGCAAGGCGTTGAATCCGAATCCATATGAACGTG  
 TGATTCCAGAAGGTACACTTTCAAAGAGAAATTTATCAAGTGAATAATTTGGATGATAACCAATATGAATCGAATT  
 GACGGTTAGTGGGAAAAACAGTGTATGAACAAAAAGATAAGTCTGTGCGGCTGGATGTCGTTATCTTGTCTGATAA  
 CTCAAATAGTATGAGTAACATTGAAAAAAGAAATGCTCGACGTGCGGAAAGAGCTGGTGAGGCGAACAGTTCTCT  
 TATTGATAAAAAATACATCTGATTGAGAAAAATAGGCTAGCGCTTGTGACTTATGCTTCCACTATCTTGTATGAGGACC  
 65 GAGTTTACAGTAGAAAAAGGGGTAGCAGATAAAAAACGGAAGCGATTGAATGATTCTCTTTTGGAAATATGAT  
 CAGACGAGTTTTACAACCAATACCAAGATTATAGTTATTTAAAGCTGACTAATGATAAGAAATGACATTGTAGAAT

TAAAAATAAGGTACCTACCGAGGCAGAAGACCATGATGGAAATAGATTGATGTACCAATTCGGTGCCACTTTT  
 CTCAGAAAGCTTTGATGAAGGCAGATGAGATTTTGACACAAACAGCGAGACAAAATAGTCAAAAAGTCATTTTCC  
 ATATTACGGATGGTGTCCCAACTATGTCGTATCCGATTAAATTTAATCATGCTACGTTTGCTCCATCATATCAAAAT  
 CAACTAAATGCATTTTATAGTAAATCTCCTAATAAAGATGGAATACTATTAAGTGATTTTATTACGCAAGCAACTA  
 5 GTGGAGAACATACAATTGTACGCGGAGATGGGCAAGTTACCAGATGTTTACAGATAAGACAGTTTATGAAAAAG  
 GTGCTCCTGCAGCTTTCCAGTTAAACCTGAAAAATATTCTGAAATGAAGGCGGCTGGTTATGCAGTTATAGGCGA  
 TCCAATTAAATGGTGGATATATTGGCTTAATTGGAGAGAGAGATTCTGGCTTATCCGTTTAAATCTAATCTGCTA  
 AAATTACCAATCATGGTGACCCTACAAGATGGTACTATAACGGGAATATTGCTCCTGATGGGTATGATGCTTTAC  
 10 GGTAGGTATTGGTATTAACGGAGATCCTGGTACGGATGAAGCAACGGCTACTAGTTTATGCAAAATATTCTAGT  
 AAACCTGAAAACTATACCAATGTTACTGACACGACAAAAATATTGGAACAGTTGAATCGTTATTTCCACACCATC  
 GTAACCTGAAAAAGAAATCAATTGAGAATGGTACGATTACAGATCCGATGGGTGAGTTAATTGATTTGCAATTGGGC  
 ACAGATGGAAGATTTGATCCAGCAGATTACACTTTAAGTGCACAAACGATGGTAGTCGCTTGAGAAATGGACAAGCT  
 GTAGGTGGTCCACAAAATGATGGTGGTTGTTAAAAATGCAAAAGTGCCTATGATACGACTGAGAAAAAGGATT  
 15 CGTGTAAAGGTCTGTACCTTGGAAACGGATGAAAAAGTTACGTTGACCTACAATGTTTCGTTTGAATGATGAGTTTG  
 TAAGCAATAAAATTTATGATACCAATGGTGAACAACTTACATCCTAAGGAAGTAGAACAGAACACAGTGCGCG  
 ACTTCCCGATTCTAAGATTCTGTGATGTGGGGAAGTATCCAGAAATCACAATTTCAAAGAGAAAAAACTTTGGT  
 ACATTGAGTTTATTAAGGTCAATAAAAAATGATAAAAAACCACTGAGAGGTGCGGCTTTTGTCTTCAAAAACAAC  
 ATCCGGATTATCCAGATATTTATGGAGCTATTGATCAAAATGGCACTTATCAAAATGTGAGAACAGGTGAAGATG  
 20 GTAAGTTGACCTTTAAAAATCTGTGATGGGAAATATCGATTATTTGAAAAATCTGAACAGCTGGTTATAAAACC  
 CGTTCAAAATAAGCCTATCGTTGCCCTTCAAATAGTAAATGGAGAAAGTCAGAGATGTGACTTCAATCGTTCCACAA  
 GATTACCAAGCGGTTACGAGTTTACGAAATGATAAGCACTATATTACCAATGAACCTATTCTCTCAAAGAGAGAA  
 TATCTCGAACTGGTGGTATCGGAATGTTGCCATTCTATCTGATAGGTTGCATGATGATGGGAGGAGTTCTATTAT  
 ACACACGGAAACATCCGTA

25

4191.3

ATGAAATCAATCAACAAATTTTAAACATGCTTGCTGCCTTATTACTGACAGCGAGTAGCCTGTTTTCAGCTGCAA  
 CAGTTTTTGGCGGCTGGGACGACAACAACATCTGTTACCGTTCAATAACTATTGGCAACAGATGGGATATGGATA  
 30 AAATTGCAATGAGTTAGAAACAGGTAACATGCTGGTAAATAAAGTGGGTGTTCTACCTGCAATGCAAAAGAA  
 TTGCGGGTGTATGTTGCTTTGGACAAATACTAATAAGTAAATTTGATGAAAAATGGCCAACTCTAGGAGTGAA  
 TATTGATCCACAAACATTTAACTCTCAGGGGCAATGCCGGCACTGCAATGAAAAAATTAACAGAAAGCTGAAGG  
 AGCTAAATTTAACACGGCAAAATTTACCAGCTGCTAAGTATAAAATTTATGAAATTCACAGTTTATCAACTTATGTC  
 35 GGTGAAGATGGAGCAACCTTAACAGGTTCTAAGCAGTTCCAAATTGAAATTGAATTACCATTGAACGATGTTGTG  
 GATGCGCATGTGTATCCAAAAATACAGAAAGCAAGCCAAAAATTTGATAAAGATTTCAAAGGTAAAGCAAAATCCA  
 GATACACCAGCTGTAGATAAAGATACACCTGTGAACCAACCAAGTTGGAGATGTTGTAGAGTACGAAATGTTTACA  
 AAAATTCAGCACTTGCTAATTATGCAACAGCAAACTGGAGCGATAGAATGACTGAAGGTTTGGCACTCAACAAA  
 GGTAGAGTGAAGTAACCTGTTGATGATGTTGCACCTGAAGCAGGTGATTATGCTCTAACAGAGTAGCAACTGGTT  
 40 TTGATTTGAAATTAACAGATGCTGGTTTAGCTAAGTGAAATGACCAAAACGCTGAAAAAACTGTGAAAAATCACTT  
 ATTCGGCAACATTGAATGACAAAGCAATTTGATGAAGTACCAGAACTAATGATGTAACTTTAATCTATGGTAATA  
 ATCCAGATCAAGGAATACTCCAAGCCGAATGAAGCAAAATGAAAAACGGCGATTGACATTGACCAAGACATGGG  
 TTGATGCTACAGGTGCACCAATTCGGCTGGAGTGAAGCAACGTTTCGATTGTTGTTAATGCTCAGACTGGTAAAGT  
 45 TGTACAACTGTAACTTTGACAAACAGACAAAAATACAGTTACTGTTAACGGATTGGATAAAAAATACAGAAATATA  
 ATTCGTTGAACGTAGTATAAAGGGTATTACAGCAGATTATCAAGAAATCACTACAGCTGGAGAAATGCTGTCAA  
 GAACTGGAAAAAGACGAAAAATCCAAACCACTTGATCCAACAGAGCCAAAAAGTTGTTACATATGGTAAAAAGTTTGT  
 CAAAGTTAATGATAAAGATAATCGTTTAGCTGGGCGAGAATTTGTAATTGCAAAATGCTGATAATGCTGGTCAATAT  
 50 TTAGCAGTAAAGCAGATAAAGTGAGTCAAGAAAGAGAACGAGTTGGTTGTTACAAACAAAGGATGCTTTAGATAGA  
 GCAGTTGCTGCTTATAACGCTCTTACTGCACAACAACAACTCAGCAAGAAAAAGAGAAAGTTGACAAAGCTCAA  
 GCTGCTTATAATGCTGCTGTGATTGCTGCCAAACATGCATTTGAATGGGTGGCAGATAAGGACAATGAAAAATGTTG  
 TGAATTAAGTTTCTGATGCACAAGGTGCTTTGAAATACAGGCCCTTCTTGAGGTACATATTACTTAGAAGAAAC  
 AAAACAGCCTGCTGGTTATGCATTACTAAGCCGTGAGAAATTTGAAGTCACTGCAACTTCTTATCAGCGACT  
 55 GGACAAGGCATTGAGTATACTGCTGGTTCAAGTAAAGATGACGCTACAAAAGTAGTCAACAAAAAAATCACTATC  
 CCACAAACGGGTGGTATTGGTACAAATATCTTTGCTGTAGCGGGGGCTGCGATTATGGGTATTGCAGTGTACGCAT  
 ATGTTAAAAACAACAAAGATGAGGATCAACTTGCTTAA

55

4191.4

ATGACAATGCAGAAAAATGCAGAAAAATGATTAGTCGTATCTTCTTTGTTATGGCTCTGTGTTTTCTCTTGTATGGG  
 TGCACATGCAGTCCAAGCGCAAGAGATCACACGTTGGTCTTGCAATTGGAGAACTATCAGGAGGTGGTATGCA  
 60 ATTGCCATCTCGTGATGGTCATCGGTTGCAAGTATGGAAAGTGGATGATTGCTATTCTATGATGATCGGTTGCAA  
 ATTGTAAGAGACTTGCAATTCGTGGGATGAGAATAAACTTTCTTCTTTCAAAAAGACTTCGTTTGAGATGACCTTCC  
 TTGAGAATCAGATTGAAGTATCTCATATTCCAAAATGGTCTTTACTATGTTGCTCTATTATCCAGACGGATGCGGT  
 TTTCTATCCAGCTGAATTTCTTTTGAATGACAGATCAAAACGGTAGAGCCTTTGGTCATTGTAGCGAAAAAACA  
 GATACAATGACAAACAAAGGTGAAGCTGATAAAGGTGGATCAAGACCACAATCGCTGGAGGGTGTGGCTTTAA  
 65 TTGGTATCAGTAGCAAGAGATGTTTCTGAAAAAGAGGTTCCCTTGATTGGAGAAATACCGTTACAGTTCTTCTGGTC  
 AAGTAGGGAGAACTCTATACTGATAAAAAATGGAGAGATTTTGTGACAAATCTTCTCTTGGAACTATCGTTT

5 CAAGGAGGTGGAGCCACTGGCAGGCTATGCTGTTACGACGCTGGATACGGATGTCCAGCTGGTAGATCATCAGCT  
GGTGACGATTACGGTTGTCAATCAGAAATTACCACGTGGCAATGTTGACTTTATGAAGGTGGATGGTCGGACCAA  
TACCTCTCTTCAAGGGGCAATGTTCAAAGTCATGAAGAAGAAAGCGGACACTATACTCCTGTTCTTCAAAATGGT  
AAGGAAGTAGTTGAACATCAGGGAAAGATGGTGGTTCCTGAGTGGAAAGGTCTAGAGTATGGGACATACTATTTA  
TGGGAGCTCCAAGCTCCAAGTGGTATGTTCAATTAACATCGCCTGTTTCTTTACAATCGGGAAAGATACTCGTA  
AGGAAGTGGTAACAGTGGTAAAAATAACAAGCGACCGGATTGATGTGCCAGATACAGGGGAAGAAACCTTG  
TATATCTTGATGCTTGTGGCATTGTTGTTGGTAG

10 4191.5  
ATGAGCCACATATACTTATCTATTTTCAAGTCTCTTGCTGATGCTAGGACTTGTCAATGTTGCTCAAGCCGATG  
AATATTTACGCATCGGTATGGAAGCAGCATATGCTCCTTTAACTGGACCCAGGATGATGATAGCAACGGAGCTG  
TCAAAATCGATGGGACCAATCAGTATGCCAACGGATACGATGTTCAAAATCGCCAAGAAAAATCGCTAAGGACTTAG  
GTAAGAAGACCTTTGGTTGTTAAAAACCAAGTGGGAAGGTCTAGTCCCTGCCCTTACTTCTGGTAAGATTGACATGAT  
TATCGCAGGTATGAGTCCAAGTGCAGAACGCAAAACAAGAAATGCGCTTTTCGAGCAGTTACTATACTAGCGAACC  
15 AGTTTTGCTGTCAAAAAAGATTCTGCCTACGCAAGTGCTAAATCTTTGGATGACTTTAACGGTGCAAAAAATCACT  
TCTCAACAAGGGGTCTACCTTTATAAATTGATTGCACAAATCCCAGGTGCTAAAAAGAAACAGCCATGGGAGAC  
TTGCTCAAAATGCGACAAGCTCTTGAGGCTGGTGTCTTGTATGCTTATGTTTCTGAACGCTCCAGAAGCACTGACTG  
CTGAAGCTGCGAACTCTAAGTTCAAGATGATTCAAGTAGAACCTGGTTTCAAACTGGGGAAGAAAGATACAGCTA  
20 TCGCTATCGGGCTTCGTAAAAATGACAATCGTATTAGCCAAATCAATGCCAGCATTTGAAACCATTTCAAAAGATG  
ACCAAGTTGCCTTGATGGATCGTATGATCAAGGAACAACCTGCCGAAGCTACAACAAGTGAAGAGACTAGCAGTA  
GTTTCTTTAGCCAAAGTTGCTAAAAATCTTTTGAAGTGGCAACAACCTTTCGCTGGTGTCTGGTATCACTCTTTTA  
ATCTCTATCGTCGGAACCATCATAGGTCTCATTATGGACTTGGCATTGGTGTCTTCGTAAGTCTCTCTCTGTA  
AAACAAAGTCAATTCAGGCTCAAAAACTAGTGGCTGGGTCTCAATGTCTACATTGAAATTTTCGCTGGTACG  
25 CCAATGATTGTTCAATCGATGGTTATCTACTATGGAAGTGGCAAGCTTTCCGGATCAACC  
TTGACCGTACACTGGCTGCTATCTTCATCGTTTCAATCAATACCGGTGCCTACATGACTGAAATCGTCCGTGGTGG  
TATCCTAGCAGTTGACAAGGGACAATTTGAAGCTGCGACTGCTCTTGGTATGACCCATAACCAGACCATGCGTAA  
GATTGTCTACCTCAGGTAGTCCGTAAACATCTACCTGCAACTGGTAATGAATTTGTATCAATATCAAAAGATACA  
TCTGATTGAACGTTATCTCTGTTGTGCAACTTTATTTCTCAGGAAATACCGTGGCAACAACAACCTATCAATACTT  
30 CCAGACATTTACAATCATCGCCGTGATTTACTTTGCTCTACCTTACCCTGAACAGTATCTACGCTTTATCGAGC  
GCAGAATGGACATGGATACCTACACTACAGGTGCTAACCAAAATGCAACCGGAGGATTTGAAATAA

35 4191.6  
ATGACACAAGCAATCCTTGAATTAACACCTCAAAAAATCTATGGACAAAACGAAGTGCTAAAAGACATTTCA  
CTCACTGTCCACAAGGGAGAGGTCACTCTATCATCGGAAGCTCTGGAAGCGGAAAAATCGACCTTCTACGCTCC  
ATTAACCTACTTGAAACACCAACTGATGGACAAATCTTTATCATGGACAAAACGTCCTCGAAAAAGGCTATGAC  
CTCAGCGAATACCGTGAAAAGTTGGGGATGGTTTTCAATCCTTTAACCTCTTTGAAAATCTCAATGTTCTTGAAA  
ACACAATCGTCGCTCAGACAACCTGTCTAAACGCGGAACGCACAGAAGCTGAAAAGATTGCCAAAGAAAAACCTG  
40 GAAAAGGTGCGCATGGGAGAAGCTACTGGCAAGCAAAACCAAAACCACTCTCAGGTGGTCAAAAAACAGCTGT  
GGCCATCGCTCGTCCCTCTCCATGAATCCGGACGCTATTCTCTTTGATGAACCAACATCAGCTCTCGATCCGAA  
ATGGTTGGAGAAGTCTCAAAATCATGCAGGACCTGGCTCAGGAAGGCTTGACCATGATTGTGTAACCCATGAA  
ATGGAATTTGCCCGTGATGTCTCTACCGGTGTTATCTTTATGGATAAGGGCGTGATCGCTGAAGAAGGTAACCAAG  
AAGACCTCTTACCAATCCTAAAGAAGACCGAACAAGAGTTCTTCAACGCTATCTCAAAATAA

45 4192.3  
ATGAAAAAGTATCAACTTCTATTCAAAATAAGTGCAGTCTTCTTACTTATTTTCGTATTTAGTCTTTCTCAGCT  
GACGCTTATCGTCCAAAATATTGGCAATTTCTTCTCAGATAGGCAATTTATTCTGGATTCAAAATATCTTGAGTT  
TACTTTTTATTGGAGTCATGATTGTGGTCTTGTAAAGACAGGCCATGGTTATCTCTCCGCATTCCAAGAAAAAA  
ATGGCTTTGGTATTGATTTTGACAGTATTAGTGCTAGTGTCCAGATCTCTTTAACGTTTCAGACAGCTAAACATG  
50 TTCAGTCAACTGCGGAAGGTTGGGCTGTATTGATTGGTTATAGTGGGACTAACTTTGCAGAGCTAGGTATTTATAT  
AGCCCTGTTCTTTCTGGTTCCACTGATGGAAGAAATGATTTATAGAGGATTACTGCAACATGCTTTCTTTAAGCAT  
CGCGATTTGGTCTTGATTGCTTCTCTCTTATTTTATTTGCTCTCCCTATTTTCAAGCCTGCCTAGTCTGTTAG  
ATATCTTCGTCTTTGCAACAGTTGGAATCATCTTTGCTGGTTTGACCGCTATACCAAGAGCATTTATCCATCCTAT  
CGCGTGATGTATCAATAATTTGTAGCGACCTTCCCGTTTTTGCTCACTTTTCTACATAGGGTCTTGGGGTAA

55 4193.1  
ATGAACAAGAAAAAATGGCTAGGTCTTGGCCTAGTTGCAGTGGCAGCAGTTGGACTTGCTGCATGTGGTAACCGC  
TCTTCTCGTAACGCAGCTTCATCTTCTGATGTGAAGACAAAAGCAGCAATCGTCACTGATACTGGTGGTGTGATG  
ACAAATCATTCAACCAATCAGCTTGGGAAGGTTTGACGGCTTGGGGTAAAGAACACAATCTTTCAAAAGATAACG  
60 GTTTCACCTTACTTCAATCAACAAGTGAAGCTACTACGCTAACCACTTGCAACAAGCGGCTGGAAAGTTACAACCT  
AATCTTCGGTGTGGTTTTGCCCTTAATAATGCAGTTAAAGATGCAGCAAAAGAACACACTGACTTGAACATATGTC  
TTGATTGATGATGTGATTAAGACCAAAAGAAATGTTGCCAGCGTAACCTTTCGCTGATAATGAGTCAGGTTACCTG  
CAGGTGGGCTGCAGCAAAAACAACCTAAGACAAAACAAGTTGGTTTTGTAGGTGGTATCGAATCTGAAGTTATCT  
CTCGTTTTGAAGCAGGATTCAAGGCTGGTGTGCTCAGTAGACCCATCTATCAAAGTCCAAGTTGACTACGCTGG  
65 TTCAATTTGGTGTGCGGCTAAAGGTAACAATTCAGCGCCGACAATACGCAGCCGCTGCAGATATTTGTTTACCA  
AGTAGCTGGTGGTACAGGTGCAGGTGTCTTTCAGAGGGCAAAATCTCTCAACGAAAGCCGCTCTGAAAAATGAAAA



5 AGTTTGGGTTATCGGTGTTGATCGTGACCAAGAAGCAGAAGGTAATACACTTCTAAAGATGGCAAAGAATCAAA  
CTTTGTTCTTGATCTACTTTGAAACAAGTTGGTACAACTGTAAAAGATATTTCTAACAAAGGCAGAAAGAGGAGAA  
TTCCCTGGCGGTCAAGTGATCGTTTACTCATTTGAAGGATAAAGGGGTTGACTTGGCAGTAACAAACCTTTCAGAAG  
AAGGTAAAAAAGCTGTGGAAGATGCAAAAGCTAAAATCCTTGATGGAAGCGTAAAAGT  
TCCTGAAAAATAA

4193.3  
10 ATGTCTAAAAAATTACAACAAATTTCCGTTCCCTTGATTCTGTATTCCTAGGAATTTTACTCGGAGCCATTGTCAT  
GTGGATCTTCGGTTATGATGCTATTTGGGGCTACGAAGAATTGTTCTATACAGCCTTTGGCAGTCTGCGTGGGATT  
GGAGAAATCTTCGTGCTATGGGTCTCTGCTCTGATTGGTCTTGGTTTGGCGTTGCCAGTCGAGCTGGTTTCTT  
TAACGTCCGACTTCTCGGTGAGGCTTTGGCAGGTTGGATTCTCAGTGGTTGGTTTGGCCTGTCCATCCAGATATG  
CCCCTGCCCTTGATGATTCTAGCAACCATCGTGATTGCTTGCTGGTGGGATTGTGCGAGCGATTCCAGGTA  
TTCTTAGGGCTATCTAGGACGTCAGAGGTTATTGTAACCATCATGATGAACTACATTGTCTTGATGATAGGGAA  
15 TGCCCTTATCCATGCTTTCCCTAAAGACTTCATGCAAAGTACAGATTGACCATTCGTGTTGGGGCTAATGCAACC  
TATCAGACACCTTGGTTGGCTGAGTTGACTGGTAACCTACGGATGAATATTGGTATTTCTTTGCCATCATTGCCGT  
TGCAATATTGGTTTATGCTCAAGAAAACAACTCTTGGTTTGAATCCGTGAGTTGGTCTTAATCCACATGCTT  
CAGAATATGCTGGTATTTCTGCCAAGCGGACTATTCTATCTATGATTATTTCAAGTGCTTGGCAGGCTCTGGT  
GGAGCTGTTGAAGGTTTGGGAACCTTCCAGAACGCTATGTTCAAGGTTGCTCATTAGCTATCCGATTTAACGGAA  
20 TGGCGGTTAGTTTGTCTGCGGCCAACTCACAATGGTATACTTTGACAGCCTTCCTATTTGGCGTTCTCCAAGTT  
GGGGCTCCTGGTATGAATGCGGCGCAGGTACCATCTGAGCTTGTACGATTGTAACAGCGCTATTATCTCTTTG  
TCAGTGTTCATTACCTTATCGAACGCTTTGTCAAACCGAAAAACAAGTTAAAGGAGGTAAGTAA

4194.1  
25 ATGGGAGTGAAAAAGAACTAAAGTTGACTAGTTTGTAGGACTGTCTCTGTTAATCATGACAGCCTGTGCGACT  
AATGGGGTAAGTAGCGATATTACAGCCGAATCGGCTGATTTTGGAGTAAATGGTTTACTTCTTGGCGAAATCA  
TTCCGCTTTTATCGTTTGATATTAGTATCGGAGTGGGGATTATTCTTTACGGTCTTGATTCTGACAGTCTCTTG  
CCAGTCTTTAGGTGCAATGGTGGCTTCTAGGAAAAATGCGGAAGCTCAGCCACGCATTAAAGCGCTTCGAGAA  
CAATATCCAGGTCGAGATATGGAAGCAGAACCAAACTAGAGCAGGAAATGCGTAAAGTATTTAAAGAAATGGG  
30 TGTCAGACAGTCAGACTCTCTTTGGCCGATTTTGATTAGATGCCGTTATTTTGGCCCTGTTCCAAGCCCTATCAA  
GAGTTGACTTTTAAAGACAGGTCATTTCTTATGGATTAACTTGGTATGTTGATACAAACCTTGTCTTCCGATT  
TTAGCAGCAGTATTCACCTTTTAAAGTACTTGGTTGTCCAACAAAGCTTTGTCTGAGCGAAATGGCGTACGACTG  
CGATGATGATGGGATTCCAGTCTTGATTTTATCTTTGACGTTTATGCGCCAGGTGGAGTCCGCCCTATACTGGAC  
AGTGTCTAATGCTTATCAAGTCTTGCAAACTATTTCTTGAATAATCCATTCAAGATTATCGCAGAGCGCGAGGCC  
35 GTAGTACAGGCACAAAAAGATTGGAATAAGAAAAAGCAAGAAAAAGGCTCAGAAAAACGAAATAA

4194.4  
40 ATGGTTATCGATCCATTTGCTATCAACGAACTAGACTATTACTTAGTTTCACTTCCACAGTGATCATATCGACC  
CATACACAGCTGCAGCAATTTCTCAATAATCCTAAGTTAGAGCATGTTAAGTTTATCGGTCCTTACCACTGTGGAGC  
AATCTGGGAAGGATGGGGTGTTCAAAAGAACGTATCATCGTTGTTAAACCAGGTGACACTATCGAATTAAGA  
TATGAAGATTATCGAGTAGAATCAATTTGACCGTACTTGGTAACTCTCCAGTGAAACGGTGCTGATGAGACA  
GGCGGTGAACCTGCTGGCTTGGCTGTTACAGATGAAGAAATGGCTCAAAAGGCTGTTAACTATATCTTTGAAACAC  
CAGGTGGAAACCATCTATCATGGTGCAAGATTCTCACTTCTCAAACTATTTTGAACCAATGGTAAAGACTTTAAAT  
TGATGTTGCTTTGAATAACTATGGTGAATAATCCGTTAGGTATCCAAGACAAATGACATCTATCGACCTTCTCGT  
45 ATGGCAGAAAACTGCGTACCAAAAGTCATTATCCAGTTTCACTATGATATCTGGTCAACTTATGGCTTCTACTA  
ATGAGATTCTAGAACTTTGGAAAAATGCGAAAAGATCGCTTGCAATACGATTCCATCCATTTATCTGGGAAGTTGG  
CGGTAAGTACACTTATCTCAAGATCAACACTTAGTAGAATACCATCATCCAGTGGTTTTGATGATTGTTTTGAA  
CAAGACTCTAACATTCAATTTAAAGCTTTGCTATAA

50  
4196.2  
55 ATGTTCTTTTTCAGGCTGGTTGCTAGTTTGTCTAATACTTATATCCATGATTTACTGGGGGTTCTTTCCAGATAG  
TCCATTTTAAATGCCTTTGAAAGTGCTATTGCGGCTCCTTTGGTGAAGAACCCTTGAAATATTGTCACTTGTTT  
TTGTTTTGGCTTTGATTCTCTGTGCGAAAAATTAATCTTTTACTTTGGAATTGCTTCCGGTTTGGGATTCCAA  
ATGATTAAGGATATTGGTTATATTCGTACGGATTGCCAGAGGGCTTTGACTTTACTATTTCCGCAATTTAGAGC  
GTATCATCTCAGGAATTCCTCTCACTGGACTTTTTCAGGTCTAGCTGTAGTAGGTGTTTACTTGTCTTACAGAGCC  
TATAAAGGACAGAAGGTTGGCAAGAAACAGGGCCTTATTTTCTAGGTTTAGCCTTGGGAACCTCACTTCTTGTTA  
60 ACTCTCTTTTGTGGAGTTGGAACAGAGTTGCCCTTTAGCGATTCCAGTGGTTACGGCTATTGCTCTCTATGGTTTT  
TATCATGCTTATTGCTTTGTGAGAAACACAATGAGTTGATGACCTAG

4197.1  
65 ATGAAGGTGGAACACGTTGCGACGTCCTTTGAGGATGTCGCATTTTATTAGGATACTAATTATGGAGTTGC  
AAGAATTAGTGGAGCGCAGTTGGGCAATCCGACAAGCTTATCAGCAACTGGAAGTTAAGCATCATGATTCCAAAGT  
GGACGGTAGAAGAAGACCTTTGGCTTTATCTAATGATATTGGAATTTCCAACGACTGGTGATGACAAAGCAAG

GACGCTACTATGATGAAACACCCCTACACACTGGAACAAAACTTTCAGAAAAATCTGGTGGCTATTAGAAGCTTT  
CTCAACGTTTGGATATAGACATTCTGACGGAATGGAAGAACTTCTCTCTGATAAAGAAAAGCAATTGAACGTTA  
GGACTTGGAAAGTAG

5 4197.4  
ATGCTTGATTGGAAACAATTTTTCTAGCCTATCTGCGCTCCCGTAGTCGTCTTTTTATCTATCTGCTTCTTTGGC  
ATTTCTTGCTTACTCTTTCAGTTTTTATTTGCCAGTCTAGGAATTTACTTCTCTACTTTTTCTTCTTGTTGCTTT  
GTAACCATATTATTTTCACTTGGGACATATTGGTGGAAACGCGAGTCTATCGCCAGGAACCTTCTCTATGGAGAGA  
10 GGGAAAGCCAAAGTCTCCTTTGGAAATAGCTTTAGCAGAAAAATTAGAAGCGCGTGAGATGGAACCTCTATCAGCAGA  
GGTCAAAAGCAGAAAGAAAACTGACGGATTGCTGGATTACTATACCTTGTGGGTCCATCAGATAAAGACCCCA  
TTGCAGCCAGTCAACTCTTAGTTGCAGAAAGTGGTCGACCGCAACTGAAGCAGCAGCTAGAACAGGAAATTTTCA  
AAATCGACTCCTATACCAACCTAGTTTTACAGTACCTGCGTTTGAAGGTTTCCATGATGATTGGTCTTAAAGCA  
15 GGTTCAAATTGAGGACTTGGTCAAGGAAATAATTGTAATATGCTCTTTCTTTATTCAAAAAGGCTTAAATGTC  
AATCTACATGACCTTGATAAAGAAATCGTGACGGATAAAAAAGTGGCTGCTAGTGGTTATTGAGCAAAATCATCTCA  
AACAGTCTCAAGTACACCAAGGAAGGTGGTCTGGAGATTTATATGGATGACCAAGAGCTTTGTATCAAAGATACG  
GGAATCGGGATAAAAAACAGTGATGTCCTCGAGTATTTGAACGTGGCTTTTCAGGATACAATGGCCGTTTGACCC  
AGCAGTCTCTGGACTTGGCCTTTATCTATCTAAGAAAAATTTCTGAAGAACTGGGGCACCAGATTCTGATCGAGTC  
TGAGGTGCGAAAAAGGAACGACAGTGGGATTGCTTGTCTCAAGTGAACCTTAGTCCTTGAGTAA

20 4211.2  
ATGGAACCTTAATACACACAATGCTGAAATCTTGCTCAGTGCAGCTAATAAGTCCCACTATCCCGCAGGATGAACTG  
CCAGAGATTGCCCTAGCAGGGCGTTCAAATGTTGGTAAATCCAGCTTTATCAACACTATGTTGAACCGTAAGAATC  
TCGCCCCGTACATCAGGAAAACTGGTAAACCCAGCTCCTGAACTTTTTAACATTGATGACAAGATGCGCTTTGT  
25 GGATGTGCTGTTTATGGCTATGCTCGTGTCTTAAAAAGGAACGTGAAAAAGTGGGGTGCATGATTGAGGAGTA  
CTTAACGCACTCGGAAAACTCTCGTGCGGTGTCAGTCTAGTTGACCTTCGTATGACCCGTCAGCAGATGATGTG  
CAGATGTACGAATTTCTCAAGTATTATGAGATTCCAGTCATCATTGTGGCGACCAAGGCGGACAAAGATTCTCGTG  
GTAATGGAACAAAGCATGAATCAGCAATCAAAAAGAAATTAACCTTTGACCCGAGTGACGATTTCATCTCTTTTC  
ATCTGTCAGTAAGGCAGGGATGGATGAGGCTTGGGATGCAATCTTAGAAAAATTGTGA

30 4211.3  
ATGACAAAAGAAACAACCTTCACTTGGTGATTGTGACAGGGATGAGTGGCGCAGGGAAAACTGTAGCCATTGAGTCC  
TTCGAGGATCTAGGTTATTTCAACATTGATAATATGCCGCCAGCTCTCTTGCCCTAAGTTTTTGCAGCTGGTTGAAAT  
TAAGGAAGACAATCCTAAGTTGGCCTTGGTAGTGGATATGCGTAGCCGTTCTTTCTTTTCAGAGATTCAAGCTGTT  
35 TTGGATGAGTTGGAAAAATCAAGATGGTTTGGATTTCAAATCTCTTTTGGATGCGGCTGATAAGGAAATGGTTCG  
CTCGTTACAAGGAAACAGCAGGAGTCACCACTAGCAGCAGAGCGTTCGTTTATGATGGAATCAAGTTGGAAC  
GTGAACCTTTGGCACCTTTGAAAAATATGAGCCAAAAATGTGGTGGATACGACTGAACTCACTCCAGTGAGTGGC  
CAAAACCCCTTGAGAGCAGTTTTAGACCAAGAAACAGCCAGTCTTTCCGTATCGAAGTCATGTCTTTGGGATT  
AAGTATGGAATCCCGATTGATGCGGACTTGGTCTTTGATGTCCGTTTCTTGCCAAATCCCTATTATTTACCAGAAT  
40 GAGAAACCAACGGGTGGATGAACTGTTTATGATTATGTCATGAACCATCCTGAGTCAGAAGACTTTTATCAA  
CATTTATTGGCCTTGATTGAGCCGATTCTGCCAAGTTACCAAAAGGAAGGTAAGTCCGTTTGGACATTGCCATGG  
GATGTACGGGTGGACAACACCGTAGTGTGGCAATTGCTAAACGCTTGGCGCAGGACTTATCCAAGAAATGGTCTGT  
TAATGAAGGGCATCGCGACAAAGACCGCAGAAAGGAACGGTAAACCGTTCATGA

45 4211.4  
ATGAGAAAAACCAAGATAACGGTGATTGGTGGAGGGAAGTCCCGTCATTCTAAAAAGTCTCGCGGAAAAA  
GATGTGGAAATCGCAGCTATCGTGACGGTGGCAGATGATGGTGGTTCTTCAGGTGAACTCCGAAAAAATATGCAA  
CAGTTGACACCGCCAGGTGATCTTCGTAAATGTCCTTGTGGCCATGTCGGATATGCCTAAGTTTTATGAGAAGGTCT  
TTCAGTATCGGTTCTCTGAGGATGCCGGAGCCTTTGCTGGCCATCCATTGGGAAATCTCATCATTGCTGGCTTGT  
50 AGAAATGCGAGGTTCAACCTATAATGCCATGCACTTATTGAGCAAAATTTTCCATACAACAGGGAAAAATTTATCCT  
TCCAGTGACCATCCTTTGACCCTTCATGCAGTCTTTAGGATGGGACAGAAAGTGGCTGGAGAGAGTCAATTGTAG  
ACCATCGAGGCATAATTGACAATGTCTATGTGACCAATGCCCTAAACGATGATACGCTCTGGCCAGCCGTCGAG  
TAGTGACAGCATCCTTGAAGTGACATGATTGCTAGGGCCAGGTTCCCTCTTTACCTCTATTTTGCCCAATAT  
CGTGATTAAGGAAATTTGGCGGGCTCTTTTGGAAACCAAGGCAGAAATTCCTATGTCTGCAATATCATGACCCA  
55 ACGTGGGAGACGGAACACTTTACAGATAGCGACCAGTGGAAAGTCTTGATCGTCACCTTGGTGGCCCTTTTATC  
GACACTGTCTTGGTGAATATTGAAAAAGTGCCTCAGGAATACATGAATTCACCGTTTGTGAATACTTAGTGC  
AAGTGGAAACAGATTTTGTAGGTCTTTGTAAGCAAGTTTCGCGCGTGATTTCATCTAACTTCCTTCGTCTGAAAA  
TGGCGGTGCTTCCAGATGGAGATTGATTGTGACGAGTTGATGCGCATTATACAGGTGAAAAAATGA

60 4213.1  
ATGAAAAATTTGATAAAGTTGCTAATAATTAGATTGATTGTTAACTTAGCAGACAGTGATTTTATATAGTAGCAT  
TGTGGCACGTTAGCAATAATTCTTCGAGCATGTTCTTAGGAATATTATTGAGTAATATCTACCGGATTG  
TTACTAATCTTTTTGGACCAGTTATTGACAGAGTAAATCCGCAAAAAATCTTATAATATCAATTTGGTTCAATT  
AGCAGTGGCTGTAATAATTTTTATTATTAATTAACCAAAATCATTTTGGGTGATAATGAGTCTAGTGTTTATTCAG  
65 TAATGGCTAGCTCCATAAGTTACGTGATAGAAGATGTGTTGATTCTCAAGTGGTAGAATATGATAAGATTGTATT  
TGCAAAATCTCTTTTAGTATTTCGTATAAAGTATTAGATTCTATTTTAATTCATTGCGATCATTTTACAGGTGG

5 CAGTAGGATTTATTTTATTGGTTAAGATAGATATAGGCATATTTTACTTGCTCTATTTATATTGTTGTTGTTAAAA  
TTTAGAACTAGCAATGCGAATATAGAAAACCTCTCTTTCAAAATATTACAAGAGAGAAGTGTGCAAGGTACAAAG  
TTTATTTTAAATAATAAAATTATTATTTAAAACAGTATTTCTTTAACGCTTATAAACTTTTTTATTCATTTTCAGACA  
GTAGTTGTACCGATTTTTCTATTGATATTTTGATGGTCCGATTTTTATGGTATTTTTTAACTATTGCTGGTTTG  
10 GGTGGTATATTGGGAAATATGCTAGCGCAATCGTAATAAAATATTTAAAATCGAATCAAATTTGTTGGTATTTTC  
TTTTTTGAACGGCTCAAGTTGGTTAGTAGCAATGTTATAAAAGACTATACTTTATCACTTATTTTATTTTTCGTTT  
GTTTTATGCTAAAGGAGTCTTCAATATTATTTTAACTCGTTGTACCAACAAATACCTCCACATCAACTTCTGGT  
AGGGTAAATACTACCATTGATTCTATTATTTCTTTTGAATGCCAATTGGTAGTTAGTTGCAAGAACGGTTATTGA  
TTTGAATATTGAATTAGTGTTAATTGCTATTAGCATACCTTATTTTTGTTTTCTTATTTTTTATACGGATAATGG  
ATTGAAAGAATTTAGTATATATTAG

4213.2  
15 ATGATGTCTAACAAAAATAAGGAAATCTGATTTTTGCGATTCTCTATACAGTCTCTTTATGTTTGTATGGCGTTAA  
ATTGCTGGCTCTTTAATGCCATCTGCCATTGCAAAATCTTGTATTATGTAGTTTATGCTCTATATGGCTCTCTT  
GTTCAAGGATAGATTGATCCAACAATGGAAGGAGATTAGAAAGACTAAAAGAAAAATCTCTTTGGAGTCTTAAC  
AGGATGGCTCTTTCTATTCTGATGACTGTTGCTTTGAATTTGTATCAGAGATGTTGAAGCAGTTTGTGGGACTAG  
ATGGACAAGGTCTAAATCAGTCTAATATTCAAAGTACCTTTCAAGAACAACCACTACTGATAGCTGTTTTGCTTG  
20 TGGAAAGGTTATGAAAAACGTTCCATCCGCAAACTTCTGGAGGACAACGTCAGCGTGTGGCCATCGCCCGTGCTA  
TACTAAGCATTATTCTGGTAGGACTTGTTTTTGCTCTGACTCATATGCCACAGTTTGGCTCTATCAGAGTGGATTGGT  
GCAGTTGGTTACTTAGGTGGAGGCTTGCCTTTCTATTATTTATGTGAAAGAAAAAGAGAATATCTACTATCCCC  
TACTTGTTCACATGTTAAGCAACAGCCTCTCCTTAATCATTTTAGCTATCAGTATAGTAAATGA

25 4224.1  
TTGAAAAAGCCAATTATCGAATTCAAAAACGCTCTAAAGTTTTTGAAGACAGCAACACCAAGGTTCTCAAAGAC  
ATCAACTTTGAGTTGGAAGAAAGGAAATTTCTACACCCTTCTAGGTGCATCTGGTTGCGGGAAATCAACTATCCTAA  
30 ACATTATTGCGAGTTTACTGGATGCGACGACAGGAGATATCATGCTAGACGGTGTTCGTATCAATGATATTCCAAC  
CAACAAGCGCGACGTACATACCGTCTTCCAATCCTATGCGCTTGTCCACATATGAATGTGTTGAAAAATGTTGCC  
TTTCCACTTCGCTTGGTAAAAATTGATAAGAAAGAAATCGAGCAGCGTGTAGCGGAAGTTCTCAAGATGGTTCACT  
35 TGGAAAGGTTATGAAAAACGTTCCATCCGCAAACTTCTGGAGGACAACGTCAGCGTGTGGCCATCGCCCGTGCTA  
TCATCAACCAACCCCGTGTGGTCTTGTGGACGAGCCTTTATCAGCGCTGGACTTGAATTTGAGAACAGACATGCA  
GTACGAATTGCGTGAAATTACAACAACGATTGGGCATTACCTTTGTCTTTGTCACTCAGCATCAGGAAGAAGCTCTT  
35 GCCATGAGTGACTGGATTTTCGTTATGAATGATGGCGAGATTGTCCAGTCTGGAACCCCTGTGGACATCTACGATG  
AGCCAAATCAACCACTTTGTTGCCACCTTTATCGGGGAGTCAAAACATCTTGCCAGGTACCATGATTGAGGACTACTT  
GGTCGAATTTAACGGCAAAACGCTTTGAAGCGGTTGATGGTGGGATGAAGCCAAATGAACCTGTTGAGGTGCTTAT  
TCGTCCAGAGGACTTGGCATTACCTTCTCTGAAGAAGGCAAGCTCCAAGTTAAGGTGATACCCAGCTTTTCCGT  
40 GGAGTTCTATTGAAATTATCGCCTATGACGAACCTTGGAAATGAATGGATGATCCACTCAACCCGTAAGGCTATCG  
TGGGTGAGGAAATCGGTCTGGACTTTGAACCAAGAAGACATCCACATCATGCGTCTCAATGAACCGAAGAAGAGT  
TCGATGCTCGTATTGAGGAGTACGTAGAAATCGAAGAGCAAGAAGCAGGTTTGATCAATGCAATCGAGGAGGAA  
GAGATGAAGAAAAACAAGCTCTAA

45 4252.1  
ATGAAATCAATGAGAATCTTATTTTGTAGCTTTAATTCAAATCAGTTTGTAGTCTGTTTCTATGGAAGGAAT  
GCATCTTGTCTTTTAAACAAAGTACAGCTTTTTTCATCGGAAGCATGGTTTTCGTTTCAGGAATCTGTGCTGGAGT  
AAATTATCTTTATACCCGTAAGCAAGAAGTCCATAGTGTCTAGCCAGTAAGAAGTCGGTGAAGCTTTTTTACAGT  
ATGTTACTCTTAATTAAATTTGTAGGAGCTGTTCTTGTTTGTGATGATACTTGTTCATCAAAAAATACGCTGCAGCA  
50 AGAATTAGTTGACTTTTTATTGCCATCCTTCTTTTCCCTATTGGGCTAGATTTGCTGATTTTTTACCCTTGAAAAA  
ATACGTGCGCGATTTTCTGCTATGCTGGACAGAAAAAGACAGTGTGGTGACTATTTAGCAACACTTCTTTTC  
TTAAGAAATCCAATGACCATTGTCTCACTTCTGATTTATATTGGACTGGGCTTGTTTTTGCAGCCTATCTTGTCCC  
AAATTCGGTTAAGAAGGAAGTTCTTTTATGGTCATATTTCCGAGATCTTGATTGGTCATTGTTACGCTCATTT  
TCTTTTAG

55 4252.2  
ATGGTTAAAAAAATTTATTGGAATGGTGCTAGCTTTACTTCTGTAAGTGTAGTGGAGTGGTGTTTTTGCTTATAC  
TATTTATCAACAAGGGACAGAAACCTTAGCTAAAACCTATAAAAAATCGGTGAAGAAACCAAGGTTATTGAAGC  
GACTGAACCTCTAACCAATCTGTTAATGGGAGTGACACCGGAAATGTTGAACGAACTGAAACTTGGGTGGGTAG  
60 AAGTGATAGCATGATCTTGATGACAGTGAATCCTTAAACGAAAAAACAACAATGATGAGTTTATAGCGGGATAT  
TCTGACGCGCATGAAATCAGGGAATGGTCAGGCTCATGAAGCGAAACTGAACTCAGCATATGCAGATGGTGGAGC  
AGAGCTTGCTATAGAAACCAATCAAAAAATGATGAATATCCATATTGATCGCTATGTGATGGTCAATATGAGAGG  
ATTGCAAAAACTAGTGGATGCAAGTGGAGGTTATACAGTCAATAATATCCTAGGTTTCCCAATTTCTATCAGTGAC  
CAAGAAGAAATTAATACTATTCTATCGGTGTTGGGGAGCAACATATTGGGGAGAGAAGAAGCCCTAGTCTATGCA  
CGAATGCGTTACCAAGATCCTGAGGGGAGTATGGTCGTCAAAAACGTCACGTTGAAGTTATTCAAAAAGTCATG  
65 GAAAAAGCTCTCAGTTTAAATAGCATTGGTCATTATCAAGAGATTCTAAAAGCTTTGAGTGACAATATGCAGACC

5 AATATTGATTGTCTGCAAAAAGTATCCCTAATTGCTAGGCTATAAAGATTCATTTAAAAACCATGAAACTCAGC  
AGTTGCAGGGTGAAGGAGAGATACTTCAAGGTGTTTCTTACCAGATTGTTTCGAGAGCACATATGTTGGAAATGCA  
AAATCTACTCCGACGTTCTTTGGGACAAGAAGTACTCAGCTTGAAACCAATGCGGTTTTATTGGAAGATTTA  
TTTGGCAGAGCACCTGTTGGTGATGAAGATAATTA

10 4256.2  
ATGAAAAACAAGCCTATGTCATTATTGCTCTCACCTCTTCTCTATTTGTCTTTTTTCTCCACAGCTTGCTGGA  
AATACTTGATTTTGAAGCTGCTATCTTTTTGCAGCATGTCGAAAAAACAGAAAAATTTGTCTTTTTATTGTTGGTTT  
TCAGCATGTCCATGACCTGTCTCTTACCCCTGTTTTGGCGAGGGATCGAAGAGCTTCTCTAAGAAAAATGCAGGC  
TAATCTCAAGCGTTTATTAGCAGGGCAAGAAGTGGTTCAGGTTGCAGATCCAGATTGGATGCCAGTTTCAAGTCC  
TTATCAGGTAAACTTAACCTTTTGACAGAGGCTCTTCAAAAAGCTGAAAAATCAGAGCCTTGCTCAGGAAGAGGAA  
ATCATCGAGAAGGAACGGAAGCGAATTGCTCGGGATTGTCAGGATACAGTCAGTCAGGAGTTGTTGCGGCCCCAC  
ATGATTTTATCGGGTATCAGTCAGCAGGCTTTGAAATTGGATAGAGAAAAAGATGCAGACCCAGTTGCAGAGTGTC  
15 ACAGCTATTTAGAAAACAGCCAGGAAGGATTGCGGGTTTTGCTCTTGCAATTTGCGACCAAGTTGAACTGGAGCAGA  
AGAGCTTGATAGAAGGGATTCAAAATCTTTTAAAAAGCTTGAGGACAAGAGTGATCTTAGGGTTAGTCTCAAGC  
AGAATATGACGAAATTCCTAAGAAAAATCGAGGAGCATATCTTCGCTATCTGCAAGAGTTGATTAGCAATACCC  
TCCGCCATGCCAGGCATCTTGCTAGATGTCTACCTCTATCAGACAGATGTTGAATTGCAACTGAAGGTGGTGGGA  
CAATGGGATTGGTTTCCAGTTAGGGAGCTTAGCAGACTTGAGTTATGGAATCGGAAATCAAGGAGCGGGTTGA  
20 AGATATGGCTGGAACAGTTCAACTCTTGACAGCTCCCAAGCAAGGGCTGGCGGTTGATATCCGTAATCCCCTGTTA  
GATAAGGAATGA

25 4263.1  
ATGATTGTTCCATTATTTCTCAAGGATTGTCTGGGCTATTCTAGGTCTGGGAATCTTTATGACATTTAGGATTTT  
AACTTTCCAGATATGACGACAGAAGGTTCTTCCCTCTTGGGGGAGCTGTTGCTGTCACTTTGATAACCAAAAGGC  
GTGAACCCATTTTACGACACTTGTGCTGTAGGAGCAGGTTGTTGGCTGGAATGGCAGCAGGCTTCTTTATA  
CAAAAGGGAAGATCCCAACCTTGCTCTCAGGGATTTGGTGATGACTTCTTGCTCACTCAATCATGCTCTTGATTAT  
GGGACGTGCGAATTTAGGCCGTGCTTGGAAACCAAGCAAAATTCAGGATGTTTTGCCTTTTGATTGCGGATTTGAATCAA  
30 CTCTTGACAGGTCTCATCTTTGTGAGTATTGTTATTGCTCTCATGCTCTTTTCTTGGACACTAACTCGGACAAGC  
CTATATTGCTACAGGGGATAATCCTGATATGGCTAGAAAGTTTCGGGATTCATACTGGACGCATGGGCTCATGGGC  
TTGCTCTTATCAAAATGGTGATGATTGCCCTGACAGGTGCCCTCATTGCTCAGCAAGAAGGTTATGCCGATGTGTCTC  
GAGGGATCGGGGTTATCGTTGTGGGGCTTGCAAGTTTGATTATTGGAGAAGTTATTTCAAGAGTTTGAGCTTGGC  
AGAGCGTTTGGTTACTATCGTTGTAGGTTCTATCGCTTATCAATTTTATGTTGGGCAAGTTATCGCACTTGGCTTTA  
ATACAAAGTTACCTTCGTTTATACAGTGCCTTGATTTTAGCAGTCTGCCTCATGATTCCAACATTTAAGCAAACAAT  
35 CTTGAAAGGAGCCAAGTTAAGCAAAATGA

40 4346.1  
ATGAAAAAATGAAAGTTTGGTCTACTGTACTTGCAACGGGAGTTGCTCTTACTACACTTGCTGCTTGCTCTGGAG  
GTTCAAATTTCTACGACTGCTTCTTCATCTGAAGAAAAAGCTGATAAAAAGTCAAGAATTAGTTATCTATTGAACTC  
AGTCTCAAATGGTCTGGTGATTGGTTAACTGCTAAAGCAAAAGAAAGCTGGTTTTAATATAAAAAATGGTTGATATC  
45 GCTGGCGCTCAATTAGCAGACCGTGTATTGCTGAGAAGAATAATGCAAGTTGCAGATATGGTATTGGAATTGGTG  
CTGTTGATTCAAATAAAATTAGAGATCAAAATTAAGTACAGTACAAGCCTAAATGGTTAGATAAAATGATC  
AATCTTATCAGATAAAGATAATTATTATACTGCTGTGATTGTTCAACCATTAGTTTAAATGGGGCGCTGATGTA  
AAAGAAATGCCTAAAGATTGGACTGAATTAGGTAGTAAAGGTAATAAAGGTAATTTCAATTTCTGGTCTTCAAGGA  
50 GGTACAGGACGGGCAATCTAGCAAGTATCTTAGTTCGATACCTTGATGATAAAGGTGAATTAGGTGTTTCCGAA  
AAGGTTGGGAAGTAGCAAAAGAAATTTGAAAAATGCATACACTCTTCAAAAGGGAGAAAGTTCAATTTGTTAAGA  
TGTTAGACAAAGAAAGATCCAATACAATATGGAATGATGTGGGGTTCTGGTGCAATTAGTTGGCAAAAAGAAACAAA  
ATGTTGTTTTCAAAGTTATGACTCCTGAGATTGGTGATACCATTTGTAAGTGAACAAACTATGGTTTTAAGCACTAG  
TAAAAAACAGCGTTAGCTAAAGAAATTTATTGATTGGTTTGGTCAATCAGAAATTCAGTAGAATATAGTAAGAA  
55 CTTTGGATCTATCTGCAATAAAGATGCCCTCAAGATCACTGAAGATACGAAGAAATTTGTTGATCAAGTG  
AAACCACAAAATATTGACTGGGAAGCTGTTGAAAGCATTGGATGAATGGGTAGAAAAAGCTGAATTAGAATAC  
GTACAATAA

60 4346.2  
ATGATTAATTTGATAATTCAAATTAATATGGTGATTTTGTGCAATTGATAATCTGAATTTAGATATACATG  
AAGGGGAATTTTTACATTTCTTGGGCCCTCAGGATGTTGTAATCAACTACTTTGAGAGCAATGGTAGGTTTTCT  
AGATCCATCATCAGGAAGTATTGAAGTTAATGGAACAGATGTCACTCAATTGGAACCTGAAAAGCGTGGAAATGG  
TATTGTATTTCAATCTTATGCGCTATTTCCAACTATGACTGTTTTTGATAATATTGCATTTGGTTTAAAAAGTTAAGA  
65 AGGTAGCTCCAGATGTTATTAAGCTAAAGTATCAGCAGTGGCAGCAAAAATTAAGATCTCTGATCAACAGTTAC  
AGCGTAATGTATCAGAAATATCTGGGGTCAACAACAAAGGGTAGCATTGGCTCGTGCTCTGGTTCTTGAACCTAA  
AATTCTTTGTCTAGATGAACCAATTGTCAAACCTTGACGCAAAATTAACGTGATAGTTTGAGAAAAAGAGTTGAAGA  
CTTCAAAAAGAGTTAGGTATTACTACTTTATATGTTACTCATGATCAAGAGGAAGCCTTGACTTTATCTGATAGAA  
TTGCAGTCTTTAACAATGGATACATCGAACAGGTCGGTACACCAGTAGAGATTTATCATATTTCTCAAAGTGAATT  
TGTATGTGATTTTATTGGAGATATTAATGTTTTGACCGATGAAACAGTCCACGAAGTATTATTGAAAAATACAAGC  
65 GTTTTCTTAGAGGATAAAAAAGGATACATTGATTAGAGAAAGTTCGATTCAATCGTGAAGTGAACAAGATTTTA  
TTCTAAAAGGGACAATTATTGATGTTGAGTTTTCTGGAGTTACAATCACTATACAATAAAAGTTTCTGAAAGTCA

GATTCTTAATGTAACAAAGTATTGATAGTCAGGCTGCTATTAGATCTGTCCGAGAAAAGTGTGGAATTATTTATCACA  
CCATCAGACGTTCTGCAATTTTAA

4346.3

5 ATGCGTCATAAAATTAATTTAAAAAGATTGGCTTATTCGTTTAGGGTTAATCTGGTTCCTAGTAACATTTATTATTTA  
TCCAAACITTTGATCTAGTAGTGAATGTATTGTAAAAGGAGGAGAAATTTCCCTTGATGCTGTACATCGTGTCTA  
AAATCTCAGAGGGCATTAGAGTATTATGAACAGTTTAAAGTTAGCATTTTCACTCATTATTACAGTTAATGTGCG  
TAGGTATTCTTTGTGTTCTATTTACAGAGTACTTTGATATTAAGGTGCTAAAATTTAAAAATTAGGTTATATGACC  
10 TCTTTAATTTATGGAGGAGTGGTTTTAGCGACTGGATATAAATTTGTCTATGGTCCTTATGGATTGATTACAAAATT  
TTTACAAAATGTTATCCCTTCTTTAGACCCTAACTGGTTTATTGGGTATGGTGCACTTATTTCATTATGACATTTT  
CAGGAACTGCTAATCATAACATTGTTTTTAACAAATACAATTCCGAAGCGTTGACTATCACACTATTGAGGCTGCTCG  
AAATATGGGAGCAAAACCATTTACTGTTTTCCGAAAAGTAGTGTTACCAACCTTAATTCCAACCTCTATTGCACTT  
ACTATTATGGTTTTTTCTTAGTGGTTTATCTGCACTAGCAGCACCCATGATTGTTGGTGGTAAAGAATTTCAAACCTAT  
15 AAATCCAATGATTATTACATTTGCAGGGATGGGGAATTCCTGCTGATTTAGCTGCCCTACTTGCAATTATTTTAGGT  
ATTGCAACTACAATTTTGCTTACTATCATGAATAAGATAGAAAAAGGTGGAAATTTATTTTCTATCTTAAGACTA  
AAGCGCCTCTTAAAAAACAAAAAATTCGCTCTAAGCCTTGGAAATATCATTGCTCACATTGTAGCATATGGATTGTT  
CACAGTTTTCTGCTTCCACTAATTTTTATAGTATTATACTCATTACAGATCCAGTTGCAATTCAAACAGGTAACCT  
TAACATTATCAAACTTTACTTTAGAAAAATTATCGCTTATTTCTTTAGTAATAGTGCGGCATTCTCTCCATTCTTGGTC  
20 AGCTTTATTTATTCTATTATTGCTGCGACAACAGCAACAATTCTCGCAGTTGTATTTGCTCGTGTGTCAGAAAAACA  
TAAATCTCGTTTTGATTTCCTATTGGAATATGGTGCTCTACTTCTTGGTTACTACCAAGTACACTTTTAGCAGTAA  
GTTTATTATTTACTTTTAATCAGCCACAATTTCTGTCTTGAATCAGATTTTGGTAGGTAGTTTGGTAATTTCTACTT  
ATTGCATATATAGTTGTAAAAATCCCATTTTCTTATAGAATGGTACGTGCTATTTTATTTAGTGTGATGATGAGAT  
GGAAGATGCAGCAAGAAGTATGGGTGCTTCACTTTTTATACTATGATGAAGGTTATCAITTCATTTATTTTACCG  
25 GTTGTCTCTCTGTTATTGCTTTAACTTTAACTCTTTAATGACTTGCAGCTTATCTGTATTCTTTTACCATCCC  
CTAGCTCAACCATTAGGTATTACGATTCTGCAAGTGATGAAACAGCAACATCTAATGCACAAGCTCTGGTAT  
TTGTTTATACAATTGTTCTGATGATTATTTCTGGAACGGTATTATACTTCACACAAAGACCGGGGCGTAAAGTAAG  
GAAATAA

Table 2

5 MEELVTLDCLFDRTKIEANANKYSFVWKKTTTEKFSAKLQEIQVYFQEEITPLLIKYAMFDDKKQKRGYKESAKNLANW  
HYNDKEDSYTHPDGWYRHFHTKYQKTQTDFFQKEIKVYYADEPESAPQKGLYMNERYQNLKAKECQALLSPQGRQIF  
AQRKIDVEPVFGQIKASLG YKRCNLRGKRQVRJDMGLVLMANNLLKYSKMKZ

10 MGKGHWNKRKRVYSIRKFAVGACSVMIGTCAVLLGGNIAGESVYVADETLTHTAEKPKKEKMIVEEKADKALETKNIV  
ERTEQSEPSSTEAIASEKKEDEAVTPKEEKVSAPKEEKAPRIESQASNQEKPLKEDAKAVTNEEVNQMIEDRKVDNFQN  
WYFKLNANSKEAIKPDADVSTWKKLDLPYDWSIFNDPDHESPAQNEGGQLNGGEAWYRKTFLDEKDLCKNVRLTF  
DGVYMSDSQVYVNGQLVGHYPNGYNQFSYDITKYLQKDGRENVLAVHAVNKQPSRWYSGSGIYRDVTLQVTDKVVHV  
EKNGTTLTPKLEEQHGHKVETHVTSKIVNTDDKDHELVAEYQIVERGGHVAVTGLVRTASRTLKAHESTSLDAILEVER  
PKLWTVLNDKPALYELITRVYRDGQLVDAKKDLFGYRYHWTNPEGFSLNGERIKFHGVSLLHHDHGALEENYKAE  
YRRLKQMKEMGVNSIRTTNHPASEQTLQAAELGLLVQEEAFDTWYGKKPYDYGRFFEKDATHPARKGEKWSDFD  
15 LRTMVERGKNPAIFMWSIGNEIGEANGDAHSLATVKRLVKVYKDVDKTRYVTMGADKFRFGNGSGGHEKIADELDA  
VGNFSEDNKYALRAKHPKWLIVGSETSSATRTGSSYRPERELKHSNGPERNVEQSDYGNDRVWGKGTATASWTFD  
RDNAGYAGQFTWGTGTDIYEPTPWHNNQNTQPVKSSYFGIVDTAGIPKHDFYL YQSQWVSVKCKPMVHLLPHWNWENK  
ELASKVADSEKIPVRAYSNASSVELFLNGKSLGLKTFNKKQTSQDGRTYQEGANANELYLEWKVAYQPGTLEAIARDES  
GKEIARDKITTAGKPAAVRLIKEDHAIADGKDLTYIYIEIVDSQGNVPTANNLVRFLHGGQLVGVNDGEQASRER  
YKAQADGWSWIRKAFNGKGVAVKSTEQAGKFTLTAHSDLLKSNQVTVFTGKKEGQEKTVLGTVEPKVQTIUEAPEMPT  
20 TVPFVYSDGSRARPTWSSVDVSKPGIVTVKGMADGREVEARVEVIALKSELVVKRIAPNTDLNSVDKSVSVYVLIDGS  
VEEYEVDKWEAEDKAKLAIPGSRQATGYLEGQPIHATLVVEEGNPAAPAVPTVVGGEAVTGLTSQKPMQYRTLA  
YGAKLPEVTASAKNAAVTVLQASAAANGMRASIFIQPKDGGPLQTYAIQFLEEAPKIAHLSLQVEKADSLKEDQTVKLSV  
RAHYQDGTQAVLPADKVTFTSTSGEVEAIRKGMLELHKPGA VTLNAEYEGAKDQVELTIQANTEKIAQSIKRPVNVVT  
DLHQEPSLPATVTVYEDKGFPKTHKVTWQAIPKEKLSYQTFEVLGKVEGIDLEARAKVSVGEIVSVVEEVSVTPIAEAP  
25 QLPESVRTYDSNGHVSSAKVAWDAIRPEQYAKEGVFTVNGRLEGTQLTTKLHVRVSAQTEOGANISDQWGTGSELPLAF  
ASDSNPSPVSNVNDKLISYNNQPANRWNTNWRNTPESVGVLFQDSGILSKRSVDNLSVGFHEDHGVGVKPSYVIEY  
YVGKTVPTAPKNPSFVGNEDHVFNDSANWKPVTNLKAPALQKAGEMNHFSFDKVEYTA VRIRKLVADNKRGTSTIEV  
QIFAKQVAAAKQQQTRIQVDGKDLANFNPDLDY YLESVDGKVPVAVTASVSNGLATVVPVSVREGEPRVIAKAENG  
ILGEYRLHFTDKSLLSHKPVAAVKQARLLQVGQALELPTKVPVYFTGKDGYESKDLTVVEVEEPAENLTAKAGQFTVR  
30 GRVLSNLVAEITVRVTDKLGTELSDNPNYDENSQAFAFASATNDIDKNSHDRVLYLNDGDHSENRRWTNWSPTSSNP  
EVSAGVIFRENGKIVERTVTQGVQFFADSGTDAPSKLVLERVYVGEFEVPTYYSNYQAYDADHPFNPNPENWEAVPYR  
ADKDLAAGDEINVTFAIKAKAMRWMERKADKSGVAMIEMTFLAPSELQESTQSKILVDGKLADFAENRQDYQIT  
YKQRPKVSVEENQVASTVVDGSDSFPVLVRLVSESGKQVKEYRIHLTKEKPVSEKTVAAVQEDLPKIEFVEKDLAY  
35 KTYEKKDSTLYLGETRVEQEGKVGKERIFTAINPDGSKKEKLEVVVEVPTDRIVLVGTRKPAQEAACKPVSEKADTKPID  
SSEASQTNKAQLPSTGSAASQA AVAAGLTLLGLSAGLVYTKGKKEDZ

40 MKIMKKKYWTLAILFFCLFNNSVTAQEIPKNLDGNITHTQTSFSESDEKQVDYSNKNQEEVDQNKFRIQIDKTELFTV  
TDKHEKNCKLELEPQINNDIVNSESNNLLGEDNLDNKIKENVSHLDNRGGNIEHDKDNLESSIVRKYEWIDDKVTGG  
GESYKLYSKNSKVSLLDSGVLDQNTGLLKNLSNHSKNYVPNKGYLGKEEGEIGIISDIQDRLGHTAVVAQVGGDN  
INGVNPVHNINVYRIFGKSSASPDWIVKAIFDAVDDGNDUINLSTGQYLMIDGEYEDGTNDFTFLKYKKAIDYANQKGV  
IIVAAALGNDSLNVSNSQSDLLKLSSRKVKRPGLVVDVPSYFSTISVGGIDRLGNLSDFSNKGSDSAIYAPAGSTLSSEL  
GLNNFINAEKYKEDWIFSATLGGYTYLYGNSFAAPKVSALAMIIDKYKLDQPYNYMFVKKFWKKHYQZ

45 MKKTWKVFLTLVTLAVVVLVACGQGTASKDNKEAELKCKVDFTLDWTPNTNHTGLVYAKEKGYFKEAGVDVLDKLP  
PEESSDLVINGKAPFAVYFQDYMAKKLEKAGITAVA AVEHNTSGIISRKSDNVSSPKDLVGKKGVTWNPTELAML  
KTLVESQGGDFEKEKVPNNDSNSITPIANGVFDTAWIYGGWDGILAKSQGV DANFMYLKDYVKEFDYSPVIANND  
YLDKNKEEARKVIAKKGQYAMEHPAEAADILIKNAPELKEKRDVIESQKYLKEYASDKEKWGQFDAARWNAFY  
KWDKENGILKEDLTDKGFTNEFVKZ

50 MKRTWRNSFVNTNLNTPFMIGNIEIPNRTVLAPMAGVTNSAFRTIAKELGAGLVVMMEMVSDKGIQYNNKTLHMLHIDE  
GENPVSIQLFGSDEDSLARAAEFIQENTKTIDVINDMGCPVNVKIVKNEAGAMWLKDPDKIYSIINKVQSVLDIPLTVKMR  
TGWADPSLAVENALAAEAGVSALAMHGRTREQMYTGHADLETLYKVAQALTKIPFIANGDIRTVQEAQRIEEVGA  
DAVMIGRAAMGNPYLFNQINHVFETGEILPDLTFEDKMKIA YEHLKRLINLKGENVAVREFRGLAPHYLRGTSGAAKL  
55 RGAISQASTLAEIETLLQLEKAZ

60 MIKNPKLLTKSFLRSFALGGVGLVTHIAIYLTFFPYIYQLEGEKFNESARVFTEYLTKTSTDEIPSLLOSYSKSLTISAHLK  
RDIVDKRLPLVHDLIDKDGKLSNYTVMLDMSVSTADGKQVTVQFVHGVVDVYEAKNILLLYLPYTLVTAIFSFSYF  
YTKRLLNPLFYISEVTSKMQLDDNIRFDESRLKDEVGEVKGQINGMYEHLKVIYELESRNEQIVKLQNKQKVSFVRGAS  
HELKTPLASLRILENMQHINIGDYKDHPKYIAKSINKIDQMSHLLLEEVLESSKFOEWTECRETTVKPVLDLSRYQELAH  
SIGVTTENQLTDATRVVMSLRALDKVLTLNLSNAIKYSKNGRVIIESEQDGYLSIKNTCAPLSDQLEHLDFIFYHSQIVTD  
KDESSGLGLYIVNNILESQMDYSFLPYEHGMEFKISLZ

MYLGDLMKAECGQFSILSFLLESQTTVKA VMEETGFSKATLTKYVTLNDKALDSGLELAHSEDENLRLSIGAAATK  
GRDIRSLFLESVVKYQILVYLLYHQFLAHQLAQELVISEATLGRHLAGLNQILSEFDLSIQNGRWGPEHQIHIFYFCL

5 FRKVWSSQEWEGHMQKPERKQELANLEECGASLSAGQKLDLVLAHISQQRLRVNACQFVIEKMRGYFDNIFYLR  
LLRKVPFFAGQHPLGVEDGEMMIFFSLLSHRILPLHTMEYILGFGGQLADLLTQLQEMKKEELLGDYTEDHVTYEL  
SQLCAQVYLYKGYLDQRYKYQLENRHPYLLMEHDFKETAEEIFHALPAFQQGTDLDDKKILWEWLQIEYMAENGGO  
HMRIGLDLTSGFLVFSRMAAILKRYLEYNRFTTIEAYDPSRHYDLLVTNNPIHKKCEQTPVYVLKNLDLMDLVAIRQLLF  
TZ

10 MEFSKKTRELSIKKMQERTLDLLIIGGGITGAGVALQAAASGLETGLIEMQDFAEGTSSRSTKL VHGGRLYLKQFDVEV  
VSDTVSERA VVQQAIPHPKSDPMLLPVYDEGDGATFSLFRLKVAMDL YDLAGVSNTPAANKVLSKDQVLERQPNLKK  
EGLVGGGVYLDFRNNDARLVIENTKRANQDQALLANHYKAEGLFDESGETGVVARDLLTDQVFEIKARLVINTTGPW  
SDKYRNLNKGTFQFSQMRPTKGVHLVVDSSKIKVSQPVYFDTGLGDGRMVFLPRENKTYFGTTDDTYTGDLEHPKVT  
QEDVDYLLGIVNNRFPESNTTDDIESSWAGLRPLIAGNSASDYNGGNGTISDESFDNLLATVESYLSKEKTRVEDVESAV  
SKLESSTSEKHLDPASVSRGSSLDRDDNGLLTLAGGKITDYRKMAEGAMERVVDILKAEDRSFKLINSKTPVSVGGELN  
PANVDSEIEFAQLGVSRLDSKEAHYLANLYGSNAPKV FALAHSLAQAPGLSLADTSLHYAMRNELTSPVDFLLRR  
15 TNHMLFMRDLSLDSIVEPILDEMGRFYDWTEEEKATYRADVEAALANNDLAELENZ

MMNELFGEFLGTLLILLGNGVAVGVLPKTKSNSSGWITVMGWGIAVAVAVFVSGKLSPAYLNPVTTIGVALKGGPL  
WASVLPYLLAQFAGAMLGQILVWLQFKPHYEAENAGNILATFSTGPAIKDTVSNLSEILGTFLVLTIFALGLYDFQA  
GIGTFAVYLLVIGIGLSGGTTGYALNPARDLCPRIHMSILPIPNKGDGDSYAWIPVPGVIGAAALVLFSLFZ

20 MTKKKIERISVIHREKILWLKWFMRDKEQPKYSVLERKMFDAAKNQDMLAYQKYATTKQITDIRVQTSEADILEAVKE  
VYVYNHNMNVIGACQRLFISQSPA YDKLNKWFNIYSDLYFSVVPLPKMGVYHEMVGIZ

25 MKNSNEAEMKLLYTDRTSLTEILTREAELV AAGKRVFYIAPNSLSFEKERA VLEYLSQASFSITVTRFAQMARYLVL  
NDLPKTTLDIGLGLAFYKCLAELOPKDLRVYGAIKQDPQLIQLLIEHEMTRKSQMSFLDENLTDKRADLLIF  
EKVTAYLQNDQQLAQESQSLHLEAIENDKVSSDFNQIALVDGTRFSAEEERVVDLLHGKGVIEVIGAYASKKAYTSPFS  
EGNLYQASVKFLHHLASKYQTPAQDCSQTHEKMDSDFKASRLLESSYDFSELALDVDEKDRENLOIWSCLTQKEEEL  
VARSIQKHLHENSLSYKHFRLGDDVASYQLSKTTFDQYQIPFYLGRSEAMAHPLTQFVESILAKRYRFRQEDLNL  
LRTDLYTDLQSDDIDAFEQYIRYLGINGLPAFQQTFTKSHHGKFNLERLNVRLRLAPLETLFASRKQAKAEKLLQKWSV  
30 FLKEGAVTKQLQDLTTTLEAVEQERQAEVWKAFCVHLEQFATVFAQSQVSLDFLALLHSGMSLSQYRTIPATVDTVL  
VQSYDLIAPLTADFVYAGLTQDNLPKISQNTSLTDEERQNLNQATEEGVQLLIASSENKKNRYTMLSLSVNSARKQLF  
LSAPSLFNESSEKESAYLQELIHFGFRREKRMNHGKLSKEDMGSYHSLSSLYAYHQQGEMSDTEQDLTFVKVLSRVI  
GKKLDQOGLNPAIPTSPSSKTLAKDTLQALYPAKQEFYLSGLTEFYRNEYSYFLRYVLGLQEELRLHPDARSHGNFL  
HRIFERALQLPNEDSFDQRLQEQIETSQEREFEATYQESLEAQFTKEVLLDVARTTGHILRHNPJAITKEEENFGGKQDQ  
35 AFIQLDNGRSVFRGKVDRIKANGAIGVVDYKSSLTQFQPHFFNGLNSQLPTYLAALKREGEQNFPGAMYLEMA  
EPVQSLMAVVKSLAGAVVEASKSMKYQGLFLEKSSYLGEFYNKNKANQLTDEEFQLLLDYNAYLKKAEEKLAGRF  
AINPYTENGRSLAPYVQHQAITGFEANYHLGQARFLEKLDLADGKRLVGEKQLQAWLEKIREELNRZ

40 MKLIPFLSEEEIQLQEAENSSKEQKKTAEQIEAIYTS AQNILVSASAGSGKTFVMAERILDQARGVEISQLFISTFTVK  
AATELKERLEKKISKIKQETDDVDLQHLGRQLADLPNAAIGTMDSFTQKFLQKHGYLLDIAPNFRILQNSQEQILLENE  
VFHEVFEAHYQGGKQKETFHLLKNFAGRGKDERGLRQQYKYIDFLQSTSNPKWLSSEFLKGFKAADFTSEKEKTE  
QKQALWDLESFFRYHLDNDAKEFAKAAYLENVQILDEIGSLNQESDSQAYQAVLARVVAISKEKNRALTNASRKA  
DLXPLADAYNEERKTQFAKLGQLSDQIAILDYQERYHGDWKLAKTFQSFMSDFEAYRQRKRQENAFEFADISHYITE  
ILENFQVRESYQERFHEVMVDEYQDTNHIQERMELLSNGHNRFMVGDQKSIYRFRQADPQIFNEKFORQYANPQEG  
45 RLILKENFRSSSEVL SATNDVFERLMDQEVGEINYDNKHQLVFANTKLTNPONKAAFLLYDKDDTGEEESQETETKL  
TGEMRLVKEILKLHQEGVAFKEIALLTSSRSRNDQILLALSEYGPVKTGDEQNNYLSLEVQVMLDTRLVIHNPLQD  
YALVALMKSPMFGFDEDELARLSLOKAEDKVHENLYEKL VNAQKMASSQKGLIHTALAEKLGQFMDILASWRLYAKT  
HSLYDLWKIYNDRFYDYVGALPNGPARQANLYALALRADQFEKSNFKGLSRFIRMIDQVLEAQHDLASVAVAPPKD  
50 AVELMTTHKSKGLEFPYV FILNMDQDFNKQDSMSEVILSRQNGLGVKYIAKMETGAVEDHYPKTIKLSIPSLTYRQNEE  
LQLASYSEQMRLLYVAMTRA EKKLVLVGKGSREKLESKEYPAAKNGKLSNSTRQLQARNFQDWLWASKVFTKDKLNF  
SYRFIGEDQLTREAIGELETQSPLQDSSQADNRQSDTIKEALEMLKEVEVYNTLHRAAIELPSVQTPSQKKFYEPVMDM  
EGVEIAGQGSVGGKISFDLPDFSTKEKVTGAEIGSATHELMQRIDLSQQLTLASLTETLKQVQTSQAVRDKINLDKILAF  
60 FDTVLGQEILANTDHL YREQPFSMLKRDQKSQEDFVVRGILDGYLLYENKIVLFDYKTDRYDEPSQLVDYRGQLALY  
EEALSRAYSIENTIEKYLLLGKDEVQVVKVZ

55 MELARHAESLGVDALATIPPIYFRLPEYSVAKYWNDISAAPTNDYVIYNIPQLAGVALTPSLYTEMLKNPRVIGVKNS  
MPVQDIQTFVSLGGEDHIVNGPDEQFLGGRLMGARAGIGTYGAMPFLKLNQLIADKDLTARELQYAINAIIQKL  
60 TSAHGNMYGVKEVLKINEGLNIGSVRSPLTPVTEEDRPVVEAAAALIRETKERFLZ

MYKTKCLREKLVFLKIFFPILYQFANYASAFVDTAMTGQYNTMDLAGVSMATSIWNPFPTFLTGIVSALVPIGHHLG  
RGKKEEVASDFYQFYLA GLSVVLLGMVFLAPILNHIGLEAAVAAVRYLWFLSIGIIPLLLFSVIRSLDLSGLTKL  
SMYLMLLLLPLNSGFNYLLIYGAFGVPELGGAGAGLGTSLAYVWVLLGISVVLVFKQEKALKHLEKRPLNMDKIKEGV  
RLGLPIGGTVFAEVAIFSVVGLIMAKFSPLIASHQSAMNFSLLMYAFPMSSISSAMAIVSVYEVGAKRFDDAKTYIGLGRW

TALIFAFTLTFLYIFRGNVASLYGNDPKFIDLTVRFLTYSLFFQLADTFAAPLQGILRGYKDTVIPFYLGLLGYWGVAP  
VYAIJZ

5 MSTLAKIEALLFVAGEDGIRVRQLAELLSLPPTGIQQSLGKLAQKYEKDPDSSLALIETSGAYRLVTKPQFAEILKEYSKA  
PINQSLSRAALETLSILAYKQPTRIEIDAIRGVNSSGALAKLQAFDLIKEDGKKEVLGRPNLYVTTDYFLDYMGINHLEEL  
PVIDELEIQAQESQLFGERIEEDENQZ

10 MDTMISRRFRLHFEALKSLKRNWMTVAAVSSVMITLTVAFASVIFNTAKLATDIENNVRVVVYIRKDVEDNSQTIE  
KEGQTVTNNDYHKVYDSLKNMSTVKSVTFSKKEEQEKLTEIMGDNWKIFEGDANPLYDAYTVEANTPNDVKTAEDA  
KKIEGVSEVQDGGANTERLFLKASFIRVWGLGIAALLIFIAVFLISNTIRITUSRSREIQIMRLVGAKNSYIRGPFLLLEGAFIG  
LLGAIAPSVLVFVYQIVYQSVNKSLLVGQNLSPDLFSLMIALLFVIGVFIGSLGSGISMRRFLKIZ

15 MKKVRFLFALLFFLASPEGAMASDGTWQKGQYLKEDGSQAANEWVFDTHYQSWFYIKADANYAENEWLKQGGDYF  
YLKSGGYMAKSEWVEDKGAFYYLDQDGKMKRNAWVGTSYVGATGAKVIEDWVYDSQYDAWYFKADGGHAEKEW  
LQIKGKDYFKSGGYLLTSQWINQAYVNASGAKVQGGWLFQKQYQSWFYKENGNYADKEWIFENGHYLYLKSGGY  
MAANEWTWDKESWFLKFDGKMAEKEWVYDSHSQAWYFKSGGYMTANEWTWDKESWFLKSDGKIAEKEWVYD  
SHSQAWYFKSGGYMTANEWTWDKESWFLKSDGKIAEKEWVYDSHSQAWYFKSGGYMAKNETVDGYQLGSDGK  
WLGGKTTNENAAYYQVVPVTANVYDSGKLSYISQGSVWLDKDRKSDDKRLAITISGLSGYMKTEDLQALDASKD  
20 FIPYYESDGRFYHYVAQNASIPVASHLSDMEVGKYYASADGLHFDGFKLENPFLFKDLTEATNYSAEELDKVFSLLNI  
NNSLLENKGATFKEAEEHYHINALYLLAHSALSNWGRSKIAKDKNNFFGITAYDTTPYLSAKTFDDVDKGILGATKWI  
KENYIDRGRTFLGNKASGMNVEYASDPYWGKIASVMKINEKLGKGDZ

25 MKKVLQKYWAWAFVVIPLLLQAIFFVPMFQGAFFSFTNWGLTYNYKFVGLNNFKLLFMDPKFMNAIGFTAILAIAM  
VVGELALGIFARVLNSKIKGQTFRAWFFFPVLSGLTVALLFKQVFNHYGLPAIGNALHIEFFTSLGTXWGAIFAAPV  
VLLWQGVAMPPIIFLAGLQSIPTTEAARIDGATSKQVFWNIELPYLLPSVSMVFILALKGGLTAFDQVFMATGGGPNN  
ATTSLGLLVYNYAFKNQFGYANAIAVILFLLVVISIQLRVSKKEFIZ

30 MMKQDERKALIGKYILLILGSVLILVPLLATLFSFKPTKDIVDNFFGFPTNFTWDFNFRLLADGIGGYYWNSVVTIVLSL  
LAVMIFPMAAYSIARNMSKRAFTIMYTLILGIFVPEQVIMIPITVMMSKLGLANTFGLILLYLYTAIPQTLFLYVGYIKI  
SIPESLDEAAEIDGANQFTTYFRIFPMMPMHATTMIINALWFWNDFMLPLLVLNRDSKMWTLPLQYNYAGQYFND  
YGPFSASYVVGISITTVLFFQRHISGMSNGAVKZ

35 MKSILQKMGEHPMLLLFLSYSTVISILAQNWMLVASVGMFLFTIFFLHYQSILSHKFFRLILQFVLFGSVLSAAFASLEH  
FQIVKKFNAYFLSPNMQVWHQNRAEVTFNPNYYGICCCFIMIAFYLTFTTKLNWLKVFCVIAGFVNLFGLNFTQNR  
AFPAILAGAIILYLTFTIKNWKAFLWSIGVFAIGLSFLSSDLGVRMGTLDDSSMEERISIWDAAGMALFKQNPFWGEGPLTYM  
NSYPRJHAPYHEHAHSLYIDTILSYGIVGTILLVSSVAPVRLMMDMSQESGKRPIIGLYLSFLTVVAHVHGFIDLALFWIQS  
GFIFLLVMCISIPLEHRMLVSDMTDZ

40 MSKMDVQKIIAPMMKFVNMRGIIALKDGMALPLTVVGSFLIMGQLPFEGLNKSIASVFGANWTEPFMQUVYSGTFAI  
MGLISCFSIAYSYAKNSGVEALPAGVLSVSAFFILLRSSYIPKQGEAIGDAISKVWFGQGGIIGAILLGVGSIYTFFKRKIV  
IKMPEQVPQAIKQFEAMIPAFVIFLSSMIVYILAKSLTNGGTFIEMIYSAIQVPLQGLTGSLYGAIGIAFFISFLWWFGVH  
GQSVVNGVVTALLLSNLANKAMLASANLSLENGAHIVTQOFLDSFLISGSGITFGLVVAAMLFAAKSKQYQALGKVA  
45 AFPALFNVNEPVVFGFIVMNPVMFVFFILVPVLAATVYGAIAATGFMQPFSGVTLPWSTPAILSGFLVGGWQGVITQLVI  
LAMSTLVYFFPFVQDRLAYQNEIKQSZ

45 MKKKDLVDQLVSEIETGKVRTLGIYGHGASGKSTFAQELYQALDSTTVNLETDPIYTSGRHLVVPKDAPNQKVATSLP  
VAHELESQRDILACRRVWMSZ

50 MKKRYLVLTALLALSAACSQEKTKNEDGETKTEQAKADGTGSKSQGAAQKKAENVNKGDDYYSIQGKYDEITVAN  
KHYPLSKDYNPGENPTAKAELVKLIKAMQEAGFMSDHYSGFRSYETQTKLYQDYVNQDGKAAADRYARSARPGYSEHQT  
GLAFDVIGTDGDLVTEKAAQWLLDHAADYGFVVRYLKGKEKETGYMAEEWHLRYVVGKEAKEAASGLSLEEYYPF  
EGGDYVDZ

55 MREPOFLNHLKKGYFKKHAKAVLALSGGLDSMFLFKVLSTYQKELEIELILAHVNHKQRIESDWEEEKELRLAAEAE  
LPIYSNFSGEFSEARARNFRYDFQEVMMKKTGATALVTAHHADDQVETIFMRLIRGTRLRYLSGICEKQVVGIEIIRPFL  
HFQKKDFPSIFHFEDTSNQENHYFRNRJNSYLPLEKENPRFRDAILGIGNEILDYDLAIAELSNINVEDLQQLFSYSES  
TORVLLQTYLNRFPDLNLTKAQFAEVQQLKSKSQYRHPKNGYELIKEYYQFQICKISPADEKEDELVLHYQNQVAY  
QGYLFSFGLPLEGELIQIPVSRETSIHHRKTGDVLKNGHRKKLRLFLIDLKIPMEKRNALIEQFGEIVSILGIATNNL  
60 SKKTKNDIMNTVLYIEKIDRZ

MRKFLIILLPSFLTISKVVSTEKEVVYTSKEIYYLSQSDFGIYFREKLSSPMVYGEVPPVYANEDLVVESGKLTPKTSFQIT  
EWRLLNKQIPVFLSNHQFIAADKRFLYDQSEVTPTKKVVLESDFKLYNSPYDLKEVKSSLSAYSQVSDIKTMFVEGRE  
FLHIDQAGWVAKESTSEEDNRMSKVQEMLSEKYQKDSFSYVVKQLTTGKEAGINQDEKMYAASVLKLSLYYTQEKIN  
EGLYQLDITTVKYVASVNDPFGSYKPEGSGSLPKKEDNKEYSLKDLITKVSKESDNVAHNLLGYYSNQSDATFKSKMSA



IMGDDWDPKEKLISSEKAGKMEAIYNQNGFVLESLTKTDFDSQRIAKGVSVKVAHKJGDADEFKHDTGVVYADSPFIL  
SIFTKNSDYDTISKIAKDVYEVLEKZ

5 MKKQNNGLIKNPFLWLLFIFFLVTGPQYFYSGNNSGGSQQINYTELVEITDGNVKELTYQPNGSVIEVSGVYKNPKTSK  
EETGIQFFTPSVTKVEKFTSTILPADTTVSELQKLATDHKAETVKHESSSGIWINLLVSVIPFGILFFFLFSMMGMNMGGG  
NGRNPMSFGRSKAKAANKEDIKVRFSVAVAGAEEEKQELVEVVEFLKDPKRFKLGARIPAGVLLGPPGTGKTLAKA  
VAGEAGVPPFSISGDFVEMFVGASRVRSLEFADAKKAAPIIFIDEIDA VGRQRGVGLGGGNDEREQTLNQLLIEMDG  
FEGNEGIIAATNRSVDLDPALLRPGRFDRKVLVGRPDVKGREAILKVHAKNKPLAEDVDLKLVAQQTGPFVGDLEN  
10 VLNEAALVAARRNKSIIIDASIDEAEDRVIAGPSKKDKTSQKERELVAYHEAGHTTVGLVLSNARVVHKYTVTPRGA  
GGYMIAPKEDQMLLSKEDMKEQLAGLMGGRVAEEIIFNVQTTGASNDFEQATQMARAMVTEYGMSEKLGVPVQYEG  
NHAMLGAQSPQKSISEQTAYEIDEVRSLLNEARNKAAEIIQSNRETHKLLAEALLKYETLDSTQIKALYETGKMPEAVE  
EESHALSIDEVSKMNDKZ

15 MKRSSLLVRMVISIFLVFLILLALVGTFFYQSSSSAIEATIEGNSQTTISQTSHFISQYIKKLETTSTGLTQQTDLVLAAYENP  
SQDKVEGIRDLEFLTLKSDKDLKTVVLTGSGQVISTDDSVQMKTSDDMMAEDWYQKAIHQGAMPVLTLPARKSDSQW  
VISVTQELVDAKGANLGVRLDISYETLEAYLNQLQLGQQGFAFIENHEFVYHPQHTVYSSSSKMEAMKPYIDTGQG  
YTPGHKSYYVQEKIAGTDWTVLGVSSLEKLDQVRSQLLWTLGASVTSLLVCLCLVWFSLEKRWIAPLKDRLRETMLEIAS  
GAQNLRAGEVGA YELREVTQFNAMLQIDQMLVAIRSQEETTRQYQLQALSSQINPHFLYNTLDTIWMMAEFHDSQR  
20 VVQVTKSLATYFRLALNQGKDLICLSDEINHVRQYLFQKQR YGDKLEYEINENVAFDNLVLPKLVLQPLVENALYHGI  
KEKEGQGHKLSVQKQDSGLVIRJEDDGVGFQDAGDSSQSLKRGVGLQNVQDRLKLHFGANYHMKIDSRPQKGTKV  
EYINRIETZ

25 MKRSSLLVRMVISIFLVFLILLALVGTFFYQSSSSAIEATIEGNSQTTISQTSHFISQYIKKLETTSTGLTQQTDLVLAAYENP  
SQDKVEGIRDLEFLTLKSDKDLKTVVLTGSGQVISTDDSVQMKTSDDMMAEDWYQKAIHQGAMPVLTLPARKSDSQW  
VISVTQELVDAKGANLGVRLDISYETLEAYLNQLQLGQQGFAFIENHEFVYHPQHTVYSSSSKMEAMKPYIDTGQG  
YTPGHKSYYVQEKIAGTDWTVLGVSSLEKLDQVRSQLLWTLGASVTSLLVCLCLVWFSLEKRWIAPLKDRLRETMLEIAS  
GAQNLRAGEVGA YELREVTQFNAMLQIDQMLVAIRSQEETTRQYQLQALSSQINPHFLYNTLDTIWMMAEFHDSQR  
30 VVQVTKSLATYFRLALNQGKDLICLSDEINHVRQYLFQKQR YGDKLEYEINENVAFDNLVLPKLVLQPLVENALYHGI  
KEKEGQGHKLSVQKQDSGLVIRJEDDGVGFQDAGDSSQSLKRGVGLQNVQDRLKLHFGANYHMKIDSRPQKGTKV  
EYINRIETZ

35 MFFKLLREALKVKQVRSKILFTIFVLVFRIGTSITVPGVNANSLNALSGLSFLNMLSLVSGNALKNFSIFALGVSPYTTASI  
VVQLLQMDILPKFVWGKQGEVGRRLNQAATRYIALVLAQVQSIGITAGFNTLAGAQLIKTALTTPQVLTIGIILTAGSMI  
VTWLGEQITDKGYNGVSMIIFAGIVSSIPEMIQGTIVDYFVNVPSRITSSIIIFVILITVLLIYFTTYVQAEYKIPQYTK  
VAQGA PSSSYLPLKVNPAVPIVFIASSITAAPAILQFLSATGHDWAWVRVAQEMLATTSPGTIAMYALLIILFTFFYTF  
VQINPEKAAETYKRVPVISMFEVLVKVQKNICLNFVVLQLLVPSSLVZ

40 MDIRQVTETIAMIEEQNFDIRTTMGISLLDCIDPDINRAAEKIYQKITTKAANLVAVGDEIAAELGIPVNRKVSVPISLIG  
AATDATDYVVLAKALDKAAKEIGVDFIGGFSALVQKG YQKGEILINSIPRALAETDKVCSSVNIIGSTKSGINMTAVAD  
MGRIIKETANLSDMGVAKLVVFNANVEDNPFMAGAFHGVGEADVHNVGVSGPGVVKRALEKVRGQSFVVAETVKK  
TAFKITRIGQLVQGMASERLGVFIVDLSLAPTPAVGDSVARVLEEMLETVGTHGTTAALALLNDQVKKGGVMAC  
NQVGGLSGAFIPVSEDEGMIAAVQNGSLNLEKLEAMTAICSVGLDMLAIPEDTPAETIAAMIADEAAIGVINMKTAVRII  
PKGKEGDMIEFGGLLGTAPVMKVNGASSVDIFSRGGQIPAPHSFKNZ

45 MTQIIDGKALAAKLQGLAEKTAKEETGLVPLVVLVGDNPASQVYVRNKERSALAAGFRSEVVRVPETITQEELL  
DLIAKYNQDPAWHGILVQLPLPKHIDEEAVLLAIDPEKDVDFHPLNMGRLWSGHPVMIPTPAGIMEMFHEYIDLEG  
KNAVVGSRNIVGKPMALLLAKNATVTLTHSRTHNLSKVAADILVVAIGRAKFVTADFKVPGA VVIDVGMNRDEN  
GKLCGDVDYEA VAPLASHITPVPGGVPMITTMLMEQTYQAALRTLDRKZ

50 MSKFNRHILVVLDSVGIGAAPDANNFVAGVDPDGASDTLGHISKTVGLNVPNMAGIGLGNIPRETPLKTVAESNPTGY  
ATKLEEVSLGKDTMTGHWEIMGLNITEPFDTFWNGFPEEILTKIEEFSGRKVIREANKPYSGTAVIYDFGPRQMETGELII  
YTSADPVQLAAHEDIIPLDEL YRICEYARSITLERPALLGRILARPYVGEFGNFRTRANRRDLAVSPFFPTVLDKLEAGI  
DTYAVGKINDIFNGAGINHDGMHNKSNHSHGIDTLTKTMGLAEFEKGFSTNLVDFDAL YGHRRNAHG YRDCLEHFEDE  
55 RLPEIIAAMRENDLLITADHGNDPTYAGTDHTREYIPLLA YSPAFKNGNGLIPVGHFADISATVADNFGVETAMIGESFL  
DKLVZ

60 MFISISAGIVTFLTLVEIPAFIQFYRKAQITGQQMHEDVQKHQAKAGTPTMGGVLFLITSVLVAFFFAFSSQFSNNVGM  
ILFLVLVGLVGLDFFLKVFRKINEGLNPKQKLALQLLGGVIFYLFYERGGDILSVFGYPVHLGFFYIFFAFWLVGFSN  
AVNLTGVDGLASISVVISLSAYGVIA YVQGMQDILLVILAMIGLLGFFIFNHPKPAKVFMDGVGSLALGGMALASMA  
LHQEWETLLIIGIVYFETTSVMMQVS YFKLTGGKRIFRMTPVHHHFELGGLSGKGNPSEWKVDFFFWGVLASLLT  
LAILYLMZ

65 LFKKNKDILNIALPAMGENFLQMLMGMVDSYLV AHLGLIAISGVSVAGNITTYQAFIALGAAISSVSKSIGQKQDQSKLA  
YHVTEALKITLLSFLGLSIFAGKEMIGLLGTERDVAESGGLYLSLVGGSIVLLGLMTSLGALIRATHNPLPLVYSFL  
SNALNLFSSLAIFVLDMGIAGVAVGTTVSRLVGLVILWSQLKLPYGPPTFGLDKELLTLALPAAGERLMMRAGDVVITA

LVVSFGTEAVAGNAJGEVLTQFNYPAPGVATATVMLLARAVGEDDWKRVASLSKQTFWLSLFLMLPLSFSIYVLGVP  
 LTHLYTTDSLAVEASVLTFLSLLGTPMTTGTVIYTA VVQGLGNARLPFYATSIGMWCI RGTGYLMGVILVGLWGLPGIW  
 AGSLLDNGFRWLFLRYRYQRYMSLKZ

5 MQTQEKHSQAAVLGLQHLLAMYSGLVPIMIALGYSAEQLTYLISTDIFMCGVATFLQLQLNKYFGIGLPPVVLGVA  
 FQSVAPLMIGQSHSGAMFGALIASGIYVVLVSGIFSKVANLFPSTVTSVITITGLTLIPVAIGNMGNVPEPTGQSLLLA  
 ATTVLILLINIFTKGFKSISILJGLVVGTAIAATMGLVDFSPVAVAPLVHVPTPL YFGMPTEISSIVMMCIATVSMVEST  
 GYYLALSDITKDPIDSTRLRNGYRAEGLAVLLGGIFNTFPYTGFSQNVGLVKLSGIKKRLPIYYAAGFLVLLGLLPKFGA  
 10 LAQIPSSVLGGAMLVMFGFVSQGMQILARVDFANNEHNFIAAVSIAAGVGLNNSNLFVSMPTAFQMFFSNGIVVASL  
 LAIVLNAVLNHKKKZ

MKDRIKEYLQDKGKVTVNDLAQALGKDSSKDFRELKTLSLMERKHQIRFEEDGSLTLEIKKKHEITLKGIFHAHKNFGF  
 FVSLEGEEDDLFVGKNDVNYAIDGDTVEVVIKKVADRNGKTA AEAKIIDILEHSLTTVVGGQIVLDQEKPKYAGYTRSKN  
 15 QKISQPIYVKKPALKLEGEVLKVFDKYPKKHDFVAVSLDVVGHSTDVGDVLEVLSDMDIVSEFPEAVVKEAESVP  
 DAPSQKDMEGRLDLDEITFTIDGADAKDLDDAVHIAKNGNLEFGVHIADVSYYVTEGSALDKALNRATSVYVTD  
 RVVPMLEPRLSNGICSLNPQVDRLTQSAIMEIDKHGRVNYTTITQTVIKTSFRMTYSVDNDILAGDEEKREYHKIVSSIE  
 LMAKLHETLENMRVKRGALNFDTNEAKILVDKQGPVDIVLRQGIARMIESFMLMANETVAEHFSKLDLPFTYRIHE  
 20 EPKAEKVQKFDYASSFGLRIYGTASEISQEALQDIMRAVEGEPYADVLSMMLLRSMQQAARYSEHNHGHYGLAADYTT  
 HFTSPIRRYPDLLVHRMIRDYGRSKEIAEHFEQVPEIATQSSNRERRAIEAEREVEAMKKA EYMEEYVGEEDYAVSSIV  
 KFGFLVELPNTVEGLIHITNLPFYHFNERDLTLRGEKSGITFRVGGQIRIRVERADKMTGEIDFSVPSEFDVIEKGLKQS  
 SRSGRGRDSNRSDKKEDKRKSGRSNDKRKHSQDKKKXGKKPFYKEVAKKGAKHGKGRGKGRRTKZ

MGTGTGTTDLILIVYLLAVLVAGIYFSKEMKGEFFKGDSVPWYVTSVSIFATMLSPISFLGLAGSSYAGSWILWFA  
 25 QLGMVVAIPLTRFILPIFARIDIDTA YDYLDRKFNKALRIISALLFIYQLGRMSIIMYLPASAGLSVLTGIDINILMLMGVV  
 AIVYSYTGGLKSVLWTDFIQGVILISGVVLAFLVLIANIKGGFGAVAETLANGKFLAANEKLFDPNLLSNSIFLVMGSGF  
 TILSSYASSQDLVQRFTTTQNIKKLNKMLFTNGVLSLATATVFYLGITGLYVYQVQNADSAASNIPQDQIFMYFIA YQL  
 PVGITGLLAAIYAASQSTISTGLNSVATSWTLDIQDVISKNMDSNRRTKIAQFVSLAVGLFSIGVSVIMAHSDIKSA YEFW  
 30 NSFMLGLVGLLGGVFLGFSVSKKANKQGA YAALIVSTVMVFYFLPPTAVSYWAYSLISISVSVSGYTVSVLTGNKVS  
 APKYTTIHDI TEKADSSWEVRHZ

MKFSKKYIAAGSAIVVSLSLCAYALNQHRSENKDNRRVSYVDGSSSQKSENLTDPQVSQKEGIAEQIVKITDQGYV  
 TSHGDHYHYNGKVPYDALFSEELLMKDPNYQLKADIVNEVKGGYIKVDGKYVYVYLDAAHADNVRTKDEINRQK  
 35 QEHVKDNEKYNVSNVA VARSQGRYTTNDGYVFNADIIEDTGNA YTVPHGGHYHYIPKSDLSASELAAAKAHLAGKNM  
 PQSLSYSSTASDNNTQSVAKGSTSKPANKSENLSLLKEL YDPSAQRYESDGLVFDPAKISRTPNGVAIPHGDHYHF  
 IPYSKLSALEEKIARMVPISGTGSTVSTNAKPNEVYVSSLSLSSNPSSLTTSKELSSASDG YIFNPKDIVETATA YTVRHGD  
 HFHYIPKSNQIGQPTLPNNSLATPSPSLPINPGTSHKHEEDGYGFDANRIAEDESFGVM SHGDHNNHYFFKKDLTEEQIK  
 VRKNIZ

MKKRAIVAVIVLLIGLDQLVKS YTVQQIPLGEVRSWIPNFVSLTYLQNRGA AFSILQDQQLFAVITLVVVIGAFWY LHK  
 40 HMEDSFWMVGLTLIIAGGLGNFDRVSQGFVDMFHLD FINFAINVADSYLTVGVILLIAMLKKEINGNZ

MNTNLASFVGLIIDENDRFYVQKDGQTYALAKEEGQHTVGDVKGFA YTMKQKRLRLTTEVATQDQFGWGRVT  
 EVRKDLGVFVDTGLPDKEIVVSLDILPELKELPWKGDQLYIRLEVDDKDRWGLLAYQEDFORLARPA YNNMQNQ  
 45 WPAIVYRLKLSGTFVYLPENNM LGFIPSEYAEPRLGQVLDARVIGFREVDRTL NLSLKPRSFEMLEND AQMILTYLE  
 SNGGFMTLNDKSSPDDIKATFGISKGQFKKALGGLMKAGKIKQDQFGTELIZ

MKDVSFLFLKKVFKSRLNWTVLALFVSVLGVTFYLSQNTANSHLESRLSRIA ANERAINENEEKLSQMSDTSSEYQF  
 AKNNLDVQKNLLTRKTEILTLLKEGRWKEAYYLLQWQDEEKNYEFVSNPTASPLKMGVDREKRIYQAL YPLNKAH  
 50 TLEFPHTGIDQIVWILEVIIPSLFVVAIIFMLTQLFAERYQNHLDTAHLYPVSKVTFAISSLGVGVG YTVLFIGICGFSFLV  
 GSLISGGQGLDYPYPIYSLVNQEBVTIGKIQDVLPGLLLAFLAFIVIVVYVLYA YFFKQKMPVFLSLIGIVGLLFGIQTQIP  
 LQRIAHLPFTYLRSEILSGRLPKQIDNVDLNWSMGMVLLPCLILFLGILFIERWGSQKKEFFNRZ

MMKFILDIVSTPAILVALIAILGLVLQKKKL PDIKGGIKTFVGLV VSGGAGIVQNSLNPFGTMFEHAFHLSGVVPNNEAI  
 55 VAVALTYYGSATAMIMFAGMVFNILARFTRFKYIFLTGHHTLYMACMIAVILSVAGFTSLPILLGGLALGIMSISPAF  
 VQKYMVQLTGNDKVALGHFSSLG YWLSGFTGSLIGDKSKSTEDIKPKSLAFLRSTV SITLSMAVITYVAIFAGSEYIEK  
 EISSGTSGLVYALQLAGQFAAGVFVILAGVRLILGEIVPAFGISERLV PNSKPALDCPIVYTYAPNAVILGFISSFVGGGLVS  
 MVIMIASGTVVILPGVVPHFFCGATAGVIGNASGGVVGATIGAFLOGLISFLPVFLMPVLGGLFGQGSTFSDADFLGSGII  
 60 LGMLNQFGSQAGIVIGLVLLAVMFGVSVFIKKPSATEEZ

MIKTFLSALS VILFSIPIITYSFFPSSNLNWLSTQPI LAQIYAFPLATMAAILSFLFFFLSYKKNKQIRFYSIGILLLSLIL  
 LLFGTDKTLSSASNKTTLKLVTVWVYANQIEAQHIERIFSHFDADMAIFPELATNIRGEQENQRUKLLFHQVGLSMANYD  
 65 IFTSPPTNSGIAPVTIVVKKSYGYFEAKTFHTTRFGTIVLH SRKQNPIDIALHTAPPLPGLMEIWKQDLNIDHNQLASKYP  
 KAIAGDFNATMRHGALAKISSHRDALNALPPFERGTWNSQSPKLFNATIDHILLPKNHYYVKDLDIVSQNSDHRCIF  
 EITFZ

- 5 MNPIQRSWAYVSRKRLRSFILFLILLVLLAGISACTLMKSNKTVESNLKSLNTSFSIKKIENGQTFKLSDLASVSKIKGL  
ENVSPELETVAKLKDKAEAVTGEQSVERRDDLSAADNNLVSLTALEDSSKDVTFSSAFNLKEGRHLQKGDSPKILHEEL  
AKKNGLSLHDKIGLDAGQSESGKQGTVEFEIIGIFSGKKQEKFTGLSSDPSENQVFTDYESSQTLNNGSEAEQVSAARFYVE  
NPKEMDGLMKQVENLALENQGYQVEKENKAFEQIKDSVATFQTFTIFLYGMLIAGAGALILVLSLWLRERVYEVGIL  
LALGKGKSSIFLQFCLEVVLVSLGALLPAFVAGNAITTYLLQTLASGDQASLQDTLAKASSLSTSILSFAESYVFLVLLS  
CLSVLALCFLFLFRKSPKEILSSISZ
- 10 MLHNAFAYVTRKFFKSIVIFLIILLMASLSLVLSIKGATAKASQETFKNITNSFSMQINRRVNQGTTPRGAGNIKGEDIKKI  
TENKAIESYVVRINAIGDLTG YDIETPETKKNLTAADRAKRFGSSLMITGVNDSSKEDKFVSGSYKLVEGEHLTNDKDK  
ILLHKDLAAKHGWKVGDKVKLDSNTYDADNEKGAKETVEVTIKGLFDGHNKSAVTYSQELYENTAITDIHTAAKLYGY  
TEDTAIYGDAFFVTADKNLDDVMKELNGISGINWKS YTLVKSSSNYPALQSSISGMKMANLLFWGSLSFSVLLALL  
LSLWINARRKEVGILLSIGLKQASILGQFTTESILAIAPALVSA YFLANYTARAIGNTVLANVTSGVAKQASKAAQASNLGG  
GAEVDGFSKTLSSLDISIQTSDFIIFVIALVLVVLVMAASSNLLRKQPKELLDDGEZ
- 15 MSQDKQMKAVSPLLQRVINISSIVGGVSLIFCTWAYQAGILQSKETLSAFIQQAGIWGPPLFIFLQILQTVVPIPGALTSV  
AGVFIYGHJITTYNYIGIVIGCAIFYLVRLYGAAFVQSVVSKRTYDKYIDWLDKGNRDFRFFIMMIWPISPADFLCMLA  
ALTKMSFKRYMTIULTKPFTLVVYTYGLTYIDFFWQMLZ
- 20 MRNMWVVKETYL RHVESWSFFMVISPFLFLGISVGIGHLQGSSMAKNNKVA VVTTVPVSAEGLKNVNGVNFYKDE  
ASAKEAIKEEKLKGYLTDQEDSVLKAVYHGETSLENGIKFEVTGTLNELQNQLNRSTASLSQEKEKRLAQTIQTEKIDE  
AKENKKFIQTLAAGALGFFLYMILITYAGVTAQEVASEKGTKIMEVVFSSIRASHYFYARMALFLVILTHIGIYVVGGL  
AAVLLFKDLPFLAQSGILDHLGDAISLNTLLFLISLFMYVVLAAFLGSMVSRPEDSGKALSPLMILIMGGFFGVTAALGAA  
GDNLLKIGSYIPFISTFFMPFRTINDYAGGAEAWISLAITVIFAVVATGFIGRMYASLVLTQDDLGWTKFKRALS YKZ
- 25 MTETIKLMAHTSVRRFKEQEIPOVDLNEILTAAQMASSWKNFQSYSVTVVRSQEKDALYELVPQEAIRQSAVFLLFV  
GDLNRAEKGARLHDTDPQPGVEGLLSSVDAALAGQNALAAESLGYGGVIGLVRYKSEEAELFNLPDYTSVFG  
MALGVPNQHHDMKPRLPLENNVFEETEQSTEAIAQYDRVQADYAGARATTSWSQRLAEQFGQAEPSSTRKNLEQK  
KLLZMLKLIATVGTNSKRSTNRQLLQYMQKHFTDKAEIELVEIKAIPVFNKPADKQVPAEILEAAKIEEADGVIGTPEYD  
HSIPAVLMSALAWLSYGIYPLLNKPMITGASYGTGLSSRAQLQLRQILNAPEIKANVLPDEFLLSHSLQAFNPSGDVLVDL  
DVIKKLDALFDDFRIFVKITEKL RNAQELLRKDAEDFDWENLZ
- 30 MNTYQLNNGVEIPVLGFGTFFKAKDGEEAYRAVLEALKAGYRHIDTAAIYQNEESVGQAIKDSGVPREEMFVTTKLWNS  
QQTYYEQTRQALEKSIEKLGDL YLDLYLHWPNNPKPLRENDAWKTRNAEVWRAMEDLYQEGKIRAIGVSNFLPHL DAL  
LETATTVPVAVNQVRLAPGVYQDQVVA YCREKGILLEAWGPFQGGELFDSKQVQELAAAHGKSAQIALAWSLAEGFLP  
LPKSVTTSRIQANLDCFGIELSHEERETLKTIAVQSGAPRVDDVDVZ
- 35 MRCKMLDPDIAIQLGLAIRWYALCIVTGLILAVLYLTMKEAPRKIIPDDILDILVAFPLAILGARLYYVIFRFDYYSQNLG  
EIPAIWNGGLAIYGGGLITGALVLYIFADRKLINTWDFLDIAAPSVMIASQLGRWGNFFNQEA YGATVDNLDYLPGFTRDQ  
MYIEGYSYRQPTFLYESLWNLLGFALILIFRRKWKSLRRGHITAFYLIWYGFGRMVEIGMRTDSLMMFFGRVSWLSVVL  
GLGIMVIYQNRKKAPYYTTEENZ
- 40 MGKLSILLGTVSGAALALFLTSDBGKQVCSQAQDFLDDLREDPEYAKEQVCEKLTEVKEQATDFVLKTKEQVESGEIT  
VDSILAQTKSYAFQATEASKNQLNNLKEQWQEKAEALDSEIIVDITEEZ
- 45 MKTKLIFWGSMLFLLSLSLITTYLAWIFYPMEIQWNLNTRVYLYKPETIQYNFHILMNYLTNPFSQVLQMPDFRSSAAG  
LHHFAVVKNLFHLVQLVALVTLPSFYVFNVRIVKDFLSLYRKSLLALVLPVMIGLGGVGLIGFDQFFTLFHQILFVGD  
DTWLFDPADKDPVIMILPETFFLHAFLLFFALYENFFGYLYLKSRRKZ
- 50 MTHYFTTEEDYIIVIGAGHAGVEASLAASRMGCKVLLATINIEMLAFMPCNPISIGGSAGKIVVREVDALGGEMAKTIDKT  
YIQMKMLNTGKGPVRAALRAQADKELYSKEMRKTVENQENLTLRQTMIDEILVEDGKVVGVRTATHQEYAAKAVITV  
TGTAALRGEEIIGDLKYSSGPNHSLASINLADNLKELGLEIGRFKTGTPPRVKASSIN YDVTEIQPGDEVNPHFSYTSRDEY  
VKDQVPCWLTYTNGTSHEIQNNLHRAPMFTGVVKGVPYRCPYSEDKIVRFADKERHQLFLEPEGRNTEEVYVQGLST  
SLPEDVQRDLVHSIKGLENAEMMRGTGYAIEYDMVLPQLRATLETKKISGLFTAGQTNGTSGYEEAAGQBIAGINAAL  
KIQGKPELILKRSYGIGVMIDDLVTKGTIEPYRLTSTRAEYRLILRHDNADMRLTEMGREIGLVDDERWARFEIKKNQF  
DNEMKRLDSIKLPVKETNAKVEEMGFKPLTDAVTAKEFLRRPEVSYQDVVAFIGPAAEDLDDKIIELIETIEKYEGYISK  
AMDQVAKMKRMEEKRIPANIDWDDISIA TEARQKFKLINPETIGQASRISGVNPADISILMVYLEGKNRSISKTLQKSKZ
- 55 MTKQVLLVDDEEHILKLLDYHLSKEGFSTQLVTNGRKALALAEETEPDFILLDMLPQLDGMVEVCKRLRAKGVKTPM  
MVSAKSDEFDKVLALGADDYLT KPFSPRELLARVKA VLRRTKGEQEGDSDNIADDSWLFGLTKVYPERHEVYKA  
NKLLSLTPKEFESDKNPFEEVFKVSKVTAQZ
- 60 MTTFKDGFLWGGAVAAHQLEGGWQEGGKISVADYMTAGRHGVAREITLGVLEGKYYPNHEAIDFYHRYKEDIA LF  
AEMGFKCFRTSIAWTRIFPKGDELEPNEEGLQFYDNLFDECLKNGIEPVITLSHFEMPYHLVTEYGGWKNRKLIDFFARF  
AEVVFVKRYKDKVKYWMTFNEINNQANYQEDFAFPTNSGIVYEEGDNREAIMYQAAHYELVASARAVKIGHEINPDFQI
- 65

5 GCMIAMCPYPTCNPKDILMAMKAMQKRYFADVHVLGKYPEHIFYWERKGISVDFTAQDKEDLLGGTVDYIGFS  
YYMSFAIDSHRENNPYFDYLETEDLVKNNYVKASEWEQIDPEGLRYALNWFTHYHLPLFTVENGFGAIDQVAAADG  
MVHDDYRIEYLGAHIREMKKAVVEDGVOLMGYTPWGCIDLVSAGTGEMRKRYGFIYVDKDDNGKGSYNRSPKKSFG  
WYKEVISSNGESVEZ

10 MDQONGFLGFLENHVMGPMGKLAQFKVVRITAAGMAAVPFTTVGSMFLVFSILPQAFSFWPIVADIFASFDKFTSLY  
MVANYATMGSLSLYFVLSLAYELTKIYAEEEEELNMNPLNGALLALMAFVMTVPQIIFDGGMMKTVTSLKEGAVIADG  
WAMGNVVARFGTGTGIFTAIIAIVTVLYRMCVKHNWVTKMPEAVPEGVSRGFTALVPGFVVAFVVFINGLLVAMGT  
DIFKVIADPGFVSNLTSNWIGLMIYLLTQLLWTVGIHGANTVFAFVSPIALANMAENAAGGHFAVAGEFSNMFVIAGGS  
GATLGLCLYAFASKSEQLKAIGRASVVPALFNINEPLIFGLPIYNPALAIPTLAPMVTATTYYVANSNFIKPIAQVPPW  
TPVGIGAFGLTADLRAVLVALVCAFAAFLVYLPFIRVYDQKLKKEEQGIZ

15 MKKFFVYSPFIPLVGLIAGVLTSTIIFVNNNLLTVLILFLVGGYVFLFKKLVRHYTRSDVEQIQYVNHQAEEESLTALLEQ  
MPVGVMLKLLSSGEVWFNPNYAELILTKEDGDFLEAVQTIKASVGNPSTYAKLGEKRYAVHMDASSGVLVYFVDVSR  
EQAITDELVTSRPVIGIVSDNYDDLEDETSESDISQINSFVANFISEFSEKHMMFSRRVSMDFRYLFTDYTVLEGLMNDK  
FSVIDAFREESKQRLPLTLISMGSYGDGNHDEIGKVALLLNLAEVRGGDQVVKENDETKNPVYFGGSAASIKRT  
RTRTRAMMTAISDKTSVDQVVFVGHKNLMDALGSAVGMQLFASNVIENSYALYDEEQMSPDIERAVSFIEKEGVTK  
LLSVKDAMGMVVTNRSLLLVDHSKTALTLSKEFYDLFTQITVIDHHRDDQDFPDNAVITYTESGASSASELVTETIQFQNS  
20 KKNRLSRMQASVLMAGMMLDTKNFTSRVTSRTFDVASYLRTRGSDSIAQELAAATDFEYREVNELIQGRKLGSVDLI  
AEAKDMKCYDVTVVISKAADAMLAMSGIEASFVAKNTQGFISISARSKLNVRIMEELGGGGHFNAAAQKQDVTLS  
EAGEKLTETVLNEMKEKEKEEZ

25 MKEKNMWKELLNRAGWILVFLAVLLYQVPLVVTSTLTKEVALLQSGLVAGLSIVVLALFIMGARKTKLASFNFSFF  
RAKDARLGLSYLVTVGSNILGSILLQSNETTANQSQINDMVQNSSLISSFFLLALLAPICEEILCRGIVPKKIFRGKENL  
GFVVGTTFALLHQPSNLPSELLYGGMSTVLSWTA YKTQRLMSILLHMIVNGIAFCLLALVVMISRTLGISVZ

30 MKEKNMWKELLNRAGWILVFLAVLLYQVPLVVTSTLTKEVALLQSGLVAGLSIVVLALFIMGARKTKLASFNFSFF  
RAKDARLGLSYLVTVGSNILGSILLQSNETTANQSQINDMVQNSSLISSFFLLALLAPICEEILCRGIVPKKIFRGKENL  
GFVVGTTFALLHQPSNLPSELLYGGMSTVLSWTA YKTQRLMSILLHMIVNGIAFCLLALVVMISRTLGISVZ

35 MDTQKIEAAVKMIEAVGEDANREGLOETPARVARMYQEISGLGQTAEHLKSFEIDDNMVEKDIFHTMCEHHF  
LPFYGRAHIAIYIPDGRVAGLSKLARTVEVYSKPKQIQRNLNIEVADALMDYLGAAGAFVVEAEHMCMSMRGVRKPGT  
ATLTTVARGLFETDKDLRDQAYRLMGLZMKDLFLKRRQAFRKECLGYLRYVLDHDFVLLVLLGFLAYQYSQLLQH  
FPENHWPIILLFVGTVSVLLLLWGGTATYMEAPDKLFLVGEIEIKLHLKRTQGISLVFWLFPVQTLFLLFAPLFLAMGY  
GLPVFLLYVLLLVGKGYFHCQKASKFFTETGLDWDYVISQESKRKQVLLRFFALFTQVKGISNSVKRRAYLDFILKAV  
QKVPKGIWQNLVYLSYLRNGDLFALSRLLLLSLLAQVFIEQAWIATAVVVLFNYLLLFQLLALYHAFDYQYLTQLFPL  
DKGQKEKGLQEVVRGLTSFVLLVELVGLITPQEKALLALLGAGLVLLVLYLPYQVKRQMQDZ

40 MRKSTVLAADNAYLIPLLETTIKSVLYHNRDVFYILNSDIAPEWFKLLGRKMEVNVNSTRSVIDKELFESYKTGPHINYA  
SYRFFATEVVESDRVLVLDSDIIVTGEATLFEIDLKGSIGAVDDVYAYEGRKSGFNTGMLLMDVAKWKEHSVNSL  
LELAAEQNVVHLGDQSILNIYFEDNWLALDKTYNYMVGIDIYHLAQECERLDDNPPTVHYASHDKPWNYSISRLRE  
LWVYVRDLWSEIAFQRSDLNIFERSNQSKQVMLVTSADIKHLEYLVQRLPDWHFHLAAPCDCSEELTSLSQYTN  
45 VTYYQNVLHRSIDWLLDSDIYVLDINTGGEVFNVTTRAQESGKIFAFDITRKSMDDGLYDGIFSVERPDDLVDRMKNI  
EIEZ

50 MTKIYSSIAVKKGLFTSFLFTYVVGSRILPFVDLNTKDFLGGSTAYLAFSAALTGGNLRSLSIFSGLSPWMSAMILWQ  
MFSFSKRLGLTSTSTIEIQDRRKMYLTLIAVIQSLAVSLRLPVQSSYAILVVLMTILLIAGTFFLVWLSDLNASMGIGGS  
VILLSSMYLNIQDVLLETFQTVHIPTGIIVLLALLTVFSYLLALMYRARYLVVNVKIGLHNRFKRYSYLEIMLNPAAGMP  
YMYVMSFLSVPA YLFILLGFIIPNHSGLAALSKEFMVGKPLWVYVYISVLFSLIFAFVTMNGEEIADRMKKSGBEYTYGI  
YPGADTSRFINRLVLRFSVIGGLFNVMAGGPMFLVLFDEKLLRLAMIPGLFMMFEGMIFTTRDEVKALRLNETYRPLIZ

55 MSSLDQELVAKTVEFRQRLSEGESLDDILVEAFAVREADKRILGMFPYDVQVMGAIVMHYGNVAEMNTGEGKTLT  
ATMPVYVLAFFSGEGVMVVTNPEYLSKRDAEEMQVYRFLGLTIGVPFTEDPKKEMKAEKKLIYASDIYTTNSNLGFD  
YLNNDLASNEEGKFLRPFNYVIDEIDDILLDSAQTPLIAGSPRVQSNYYAIDTLVTTLVEGEDYIFKEEKEEVWLTTKG  
AKSAENFLGIDNLYKEEHASFAHLLVYAIRAHKLFKDKDYIIRGNEMVLVDKGTGRLEMETKLGGLHQAJEAKHEV  
KLSPETRAMASITYQSLFKMFNKISGMTGTGKVAEKEFIETYNMSVVRIPTRNRPRQRIDYPDNLVYTLPEKVYASLEYIKQ  
YHAKGNPLLVPVGSVEMSQLYSSLLFREGLAHNVLNANNAAREAQISESGOMGAVTVATSMAGRGTDIKLGKVAEL  
60 GGLVIGTERMESQRIDLQIRGRSGRQDPMGSKFFVSLEDDVIKFGPSWVHKKYKDYQVQDMTQPEVLKGRKYRKL  
VEKAQHASDSAGRSARRQTLLEYAESMNIQRDIVYKERNRLIDGSRDLEDVVDIERYTEEVAADHYASRELLFFHFTVTN  
ISFHVKEVPDYIDVTDKTA VRSMFKQVIDKELSEKKELLNQHDLYEQFLRLSLLKAIDDNWVEQVDYLQQLSMAIGGQS  
ASQKNPIVEYYQEA YAGFEAMKEQHADMVRNLLMGLVEVTPKGEIVTHFPZ

65 MIGTFAAALVAVLANFTVPIETPNSANTEIAPPDGICQVLSNLLKLVDNPNVALLTANYIRILSWAVIFGIAMREASKNS  
QELLKTIADVTSKIVEWIINLAPFGILGLVFKTISDKGVGLSANYGILLVLLVTTMLFVAPVVPNPLIAFFMRRNPYPLVW

NCLRVSQVTAFFTRSSATNPVNMKCHDLGLNPDYTSVSIPLGSTINMAGVAITINLLTLAAVNTLGPVDFATAFVLSV  
VAAISSCDASGIAGGSLLIPVACSLFGISNDIAIQIVGVGVIGVIQDSCETALNSSTDVLFATAVEYAATRKKZ

- 5 MSISQRTTKLILATCLACLLAYFLNLSSAVSAGIALLSLSDTRRSTLKLARNRFLSMALLAIGVLAFLHSGFHIWSLGLY  
LAFYVPLAYKMGWEIGTPSTVLVSHLLVQESTSPDLLVNEFLFAIGTGFAILLVNLVMPSSREEEIQHYHTLVEEKLKDI  
LQRFKYYSRGGDRNRAQLVAELDTLLKEALRLVYLDHSDHLFHQTDYHIHYFEMRQRQSRILRNMAQQINTCHLAAS  
ESLILAQLFSKIAQQLSQTNPASDLLDEIERYLEVFRNRSLPKTREEFETRATLLQLLREAKTFIQVKVDFYQYKYZ
- 10 MEIMSLAIAVFAVIIGLVIGYVSISAKMKSSQEAELMLLNAEQEATNLRGQAEREADLLVNEAKRESKSLKKEALLBAK  
EEARKYREEVDAEFKSERQELKQIESRLTERATSLDRKDDNLSKEQTLQKEQSSIDRAKNLDAREEQLEEVERQKEAE  
LERIGALSQAEARDIILAQTEENLTREIASRUREAEQEVKERSDKMAKDILVQAMQRIAGEYVAESTNSTVHLPDOTMKG  
RIIGREGRNRTFESLTGVVDIIDDTPVVTLSGDFPDRREIARMTMEMLLKDGRIHPARIEELVEKNRQIDNKIREYGEA  
AA YEIGAPNLHPDLMKIMGRLQFRTSYQGNVLRHSIEVAKLAGIMASELGENAALARRAGFLHDIGKAIDHEVEGSHVE  
15 IGMELARKYKEPPVYVNTIASHHODVEAESVIAVVAADALSAARPGARSESLESYKRLHDLLEEIANGFEGVQTSFAL  
QAGREIRIMVNPCKIKDDKVITLAHKVRKKIENLDYPGNIKVTVIRELRAVDYAKZ
- MMLKPSIDTLLDKVPSKYSLVILEAKRAHELEAGAPATQGFSEKSTLRALEEIESGNVTIHPDPEGKREAVRRRIEEER  
RKEEEEEKKKEQIAKEKEDGEKIZ
- 20 MSAYQLPTVWQDEASNQGAFTGLNRPTAGARFEQNLPGQEAQFQLYSLGTPNGVKVTLLEELLEAGFKEAAAYDL YKI  
AIMDGDQFGSDFVCLNPNSKIPALLDQSGTENVRVFESAHILLYLAEKFGAFLPSNPVEKVEVLNWLFWQAGAAPFLG  
GGFGHFFNYAPEKLEYPINRFTMEVKRQLDLDLDELAKQKPYIAGNDYTIADIAIWSWYQQLVQGNLYQGSAKFLDASS  
YQNLVKWAEKIANRPAVKRGLVTVYTEIKZ
- 25 LASLITSIMFYVGFVLDLRTIQKLSREETVIDPLGATLGIISAAIMFVVYLYNTRLSKKSNSNALKAAAKDNLSDAVTS  
GTAIALASSFNYPVDKLVAIITFFILKTA YDIFIESSFSLSGDFDRLLEDYQKAIMIPIKISKVKSQRGRITYGSIYLDIT  
LEMNPDLSVFESHEIADQVESMLEERFGVFDTVHIEPAPIPEIDLVYKLLMREQLDQGNQLEELLTDDFVYIRQ  
DGEQMDKEAYKTKKELNSAIKDIQTSISQKTKLCYELDGIHTSIWRRHETWQNIHFQETKKEZ
- 30 MTKLVATDMDGTFLDGNRFDMDRLKSLLSYKKEGIYFAVASGRGFLSLEKLFAGVRDDIIFIAENGSLVEYQGGDL  
YEATMSRDFYLATFEKLTSPYVDINKLLLTKGKGSYVLDVDETLYLKVSHYNEINQKVASLEDITDDIFKFTNTNTEE  
TLEDGEA WVNENVPVKAMTTGFESIDIVLDYVDKGVAIVELVKKLGITMDQVMAFGDNLNDLHMMQVVGHPVAPE  
NARPEILELAKTVIGHHKERSVIA YMEGLZ
- 35 MADIKLIALDLDTLLTDDKRLTDRKTETLOAARDRIKVVLTGRPLKAMDFFLHELGTDDGEDEYTTTFNGGLVQK  
NTGEILDKT VFSYDDV ARLYEETEKLSPDAISEGTVYQSDQESLYAKFNPALTFVPVDFEDLSSQMTYNKCVTAF  
QEPDAAIQKISPELFDQYEIFKSREMILLEWSPKNVHKATGLAKLISHLGIDQSVMACGDEANDLSMIEWAGLVAM  
QNAVPEVKAAANVVTMTNDEEAVA WAEIYVLENZ
- 40 MESLLILLIANLAGFLIWRQDRQEKHLSKSDQADHLSQDLDFRFDQARQASQLDQKDLVVSDDLQEVRIELH  
QGLTQVRQEMTDNLLQTRDKTDQRLQALQESNEQRLQEMRQTVEEKLKTLQTRLOASFETVSKQLESVNRGLGEMQ  
TVARDVGALNKVLSGTGTRGILGELQLGQIUEDIMTAQYEREYATVENSSEYVYAIKLPQQGDQYEVYLPDSKFPLA  
DYRLEEA YETGDKDEIERCRKSLASVKRFARDIRNKYAPRRTNFGVLFVPTGLYSEIVRNPVFDLRRREEQIIVA  
45 GPSTLSALLNSLSVGFKTLNIQKSADHISKTASVKTFFGKGGILVKAQKHLQHASGNIDELLNRRTIAIERTLRHIELSE  
GEPALDLLHFQENEEYEDZ
- MKISHMKKDELFEFGLYKSAIDLQTRAGKNYLAFTQDDSGEIDGKLWDAOPHNIEAFTAGKVVMHMKGRREVYNNT  
50 PQVNOITLRLPQAGEPNPDAFKVKSVDVKEIRDYMSQIMFKIENPVWQRIVRNLYTKYDKEFYSYPAAKTNHHAFT  
GLAYHTATMVRADASEVYPQLNKSLLYAGIMLHDLAKVIELTGPDQTEYTVRGNLLGHIALIDSEITKVTVMELGIDDT  
KEEVVLLRHVTLSSHGLLEYGSPVRPRIMEAEIIMIDNLDASMMMMSTALALVDKGEMTNKIFAMDNRSFYKPDLDZ
- MSEKAKKGFKMPSSYTVLLIIMAVLTFWIPAGAFIEGITYETQPNPQGIWDLMAPIRAMLGTHPEEGSLIKETSAAD  
55 VAFILMVGGLGIVNKTGALDVGIASTVKKYKREKMLLVLMLPLFALGGTTYGMGEETMAFYPLLVPMMAVGFDS  
LTGVAILLGSQIGCLASTLNPATGASATAGVGTGGIVLRLIFWVTLTALSTWVYRYADKIQDPTKSLVYSTRKED  
LKHFNVEESSVESTLSSKQKSVLFLVLTFLMVLSPFWTDLGVTIFDDFNTWLTGLPVIGNIVGSSTALGTWYFPEG  
AMLFAFMGILIGVYGLKEDKIUSFMNGAADLLSVALIJAARGIQVIMNDGMITDTILNWGKEGLSLSSQVFTVVTYF  
YLPMSFLIPSSGLASATMGIMAPLGEFVNVRPSLIITA YQSASGVNLIAPTS GIVMGALALGRINIGTWWKFMGKLVVA  
60 IIVVTIALLLGLTFPLZ
- MSNSFVKLLVSQLFANLADIFFRVTIANIYISKSVIATSLVPLIGISSFVASLLVPLVTKRLALNRVLSLQFGKTLAIL  
VGMFTVMQSVAPLVYLVVAISILDGFAAPVSYAJVPYATDLGKANSALSMTEA VQLIGWGLGGLLPATIGLLPTT  
CINLVLYIISFLMLFLPNAEVEVLESETNLEILLKGWKLVARNPRLRLFVSANLLEIFSNITWVSSILVFTVTELLNKTESY  
WGYSNTAYSIGIISGLIAFRLSEKFLAAKWEPLFTPNLKTIONPCLSLDPGWFLFSPNGCFLLDKKEFPLYGISVEKNTK  
65 RKEITHMNSLPHHFNKNSFYQLSFDGGHLTYGGLIFFQELFSQKLKERISKYLVTDQRRYCRYSDSDILVQFLFQLL

5 TG YGTDYACKELSADAYFPKLEGGQLASQPTLSRFLSRTDEETVHSLRCLNLELVEFFLQFHQLNQLIVDIDSTHFTTY  
 GKQEGVAYNAHYRAHGYHPLYAFEGKTGYCFNAQLRPGNRYCSEEDSFTTPVLERFNQLLFRMDSGFATPKLYDLIE  
 KTGGYYLKLKKNVLSRLGDLSPCQDEDLTILPHSAYSETLYQAGSWSHKRRVCQFSEKKEGNLFYDVISLVTNMTS  
 GTSQDQFQLYRGRGQAEENFIKEMKEGFFGDKTDSSTLIKNEVRMMMSCLAYNLYFLKHLAGGDFQTLTKRFRHLFL  
 HVVGKCVRTGRKQLKLSSLYAYSELSFALYSRIRKYNLNLPPVPEPRRKASLMMHZ

10 MMEFFQQLPHLEPYGNPOYFVYVIAATLPFIGLFFKKRFAWYEVLVSLFFIVTMLVGGKTNQLAALGIYLCWEILLLL  
 YKHRYKSKDGKVVYLVSLFLLPIIFVKVQPAINGTQSLGFLGISYLTFRSVGIVIELRDGVKDFTLWEFLRLLFMPT  
 FSSGPIDRFKRFNENYQAIPEDELMDMLDESRYIMWGFLYKFIHAHVLGETLLPPLKNLALQSGGFFNLYALAVMYT  
 FGLELFFDFAGYSMFALAINLMGIRSPINFNPKFLSRDLKEFWNRWHMSLSFWFRDFVFMRMVMVLTRKKVFKNRN  
 VTSSMAYTNMLMGFWHGVYTYIAYGLFHGLGLVNDAWVRKKKTLNKKERKAGKAALPENRWIQLGMVVTFFH  
 VVMLSFLIFSGFLNNLWFKKZ

15 MLKRLWMIFGPVLIAGLLVLLIFFYPTMHHNLGAEKRSVATTIDSFKERSQKVRALSDPNVRFVFFGSSEWLRF  
 GAHPAVLAEKYRNSRYPYLLGQGAASLNQYFGMQMLPQLENKQVYVYISQWFSKNGYDPAAFQYFNGDQLTS  
 FLKHQSGDQASQYAAATRLQQFPNVAMKDLVQKLASKEELSTADNEMIELLARFNERQASFFGQFSYRGVYVNDKHV  
 AKYLKILPDQFSYQAIJEDVVKADAEKNTSNEMGMENYFYNEQKDKLKKLSDSKSFTYLSKPEYNDLQLVLTFQSK  
 SKVNPFIPIPPVKKWMNYAGLREDMYQQTQKIRYQLESQGTNIADFSKDGGEFFMKDTHLGLWGLWLAFDKAVD  
 PFLSNPTTAPTTHLNERFFSKDWATYDGDVKEFQZ

20 MEKNLALKQTTDQEGPAIEPEKAEDTKTVQNGYFEDA VKDRTLSDYAGNWQSVYFLEDGTFDQVFDYKAKLTG  
 KMTQAEYKAYYTKGYHTDVTKINTDNTMEFVQGGQSKKYTYKYVGKILTYKKGNRGVRLFEATDADAGQFKYV  
 QFSDHNVA PVKAEHFHIFGGSQEQALFEEDNWPYTYPDNLSGQEQIAQEMLAHZ

25 MKDGHLLAHHIRLLNGRIFQKLLSQDPEALYRGEQKILAVLWNSSETGCATATDIALATGLANNTLTMMKKLEEQKL  
 VIVSPCGKDKRKKYLVLTGLKSQKEVGHVRSQKLDTFYKGFSEEEHQFEGFQERILANLKEKGNEVZ

30 MTNLIAFTQDRFSDWLTALSOHLQSLTLLAILLAIPAVFLRYHEKLA DWVLQIAGIFQTPSLALLGLFIPLMGIGTL  
 PALTALVIYAIFFILQNTITGLKGDIPNLQEAIAFGMTRWERLKKFEIPLAMPVIMSGIRTA AVLIJGTATLAALIGAGGL  
 GSPILLGIDRNNASLILIGALSSA VLAIAFNFLKVMKAKLRTIFSGFALVALLGLSYSPALLVQKEKENLVIAKGIGPEP  
 EILANMYKLLIEENTSMTATVKPNFGKTSFLYEALKKGDIDYIPEFTGTVTESLLQSPKVSHEPEQVYQVARDGIAKQD  
 HLA YLKPMYSQNTYAVAVPKKIAQEYGLKTSIDLKKEVQGLKAGFTLEFNDREDGNKGLQSMYGLNINVA TIEPALRY  
 QAIQSGDIQITDAYSTDAELERYDLQVLEDDKQLFPPYQAGAPLMKEALLKKHPELERVLNTLAGKITESQMSQLNYQV  
 VEGKSAKQVAKEFLQEQGLKKZ

35 MMHTYLQKKIENIKTTLGEMSGGYRRMVAAMADLGSGTMAKAIWDDLFAHRSFAQWYLLVLGSPFLWLELVYEHRI  
 VDWIGMICS LTGUCVIFVSEGRASNLYLGLINSVYILALQKGFYGEVLTTLTYFTVMQPIGLLVWYVQAQFKKEQEFV  
 ARKLDGKGWTKYLSISVLWWLAFGFIYQSIGANRPYRDSITDATNGVGQILMTAVYREQWIFWAATNVFSIYLWWGES  
 LQIQGKYLIYLNLSLVGWYQWSKAAKQNTDLLNZ

40 MRNMKAKYAVVWAFFLNLTYAIVEFIAGGVFGSSAVLADSVHDLGDAIAIGISAFLETISNREEDNQYTLGYKRFSLG  
 ALVTA VILVTGSVLVILENVTKILHPQPVNDEGILWLGIAITINLLASLVVGKCKTKNESILSHFLEDTLGWVA VILMAI  
 VLRFTDWYILDPLLSLVISFFILSKALPRFWSTLKIFLDAVPEGLDIQVKSGLERLDNVASLNQLNLWTMDALEKNAIV  
 HVCLKEMEHEMETCKESIRIFLKDCCGFQNTIETDADLETHQTHKRKVCDLERSYEHQHZ

45 MIEYKNVALRYTEKDVLRDVLNLIQIEDGEFVVLVPGSGSGKTTMLKMINRLEPTDGNIMYMDGKRIKDYDERELRLSTG  
 YVLQALALFPNLTV AENIALIPEMKGWSKEEITKTELLAKVGLPVAEYGHRLPSELSGGEQQRVGIVRAMIGQPKIFL  
 MDEPFSALDAISRKQLQVLTKELHKEFGMTTIFVTHDTDEALKLADRIAVLQDGEIRQVANPETILKAPATDFVADLFG  
 GSVHDZ

50 MSAVAISAMTKVMQETHGNPSSIHGHRQAGKLLREARQELAQLLRTKPQHIFFTSGGTEGNNTTIIGYCLRHQEQGKH  
 ITTAIEHHA VLETIDYLVQHFGFEATIQPENQETAAQIQKALRDDTILVSTMVFNNETGNLLPIAIEGQILKQHPAA YH  
 VDAVQAIGKIPHSLEELGIDFLTASAHKFHGPKGIGFLYASSMDFDSYLHGGDQEQKKRAGTENLPAIVGMVAALKEDL  
 EKQEEHFQHVQNLETAFLAELEGIQYYLNRGKHHLPYVLNIGFPQGKNDLLLRDLAGISISTGSACTAGVVQSSHVLE  
 55 AMYGANSERLKESSLRISLSPQNTVEDLQTLAKTLKEIGGZ

60 MLFKLSKEKIELGLSRLSPARRIFLSFALVILLGSLLSLPFVQVESSRATYFDHLFTA VSAVCVTGLSTLPVAHTYNIWG  
 QIICLLLIQIGGLGLMTFIGVFIYQSKQKLSLSRATIQDSFSYGETRSLRKFFVYSIFLTTFLVESLGAILLSRLIPQLGWGR  
 GLPSSIFQILAFPCNAGFDNLGSTSLFAFQTDLLVNLVIAGLITGGLGFMVWFDLAGHVGRKKKGRLLHFHTKLVLLTTI  
 GLLLFGTATTLFLEWNNAGTIGNLPVADKVLVSFFQTVTMRTAGFSTIDYTAHPVTLIIYILQMFLGGAPGCTAGGLK  
 ITTFFVLLVFARSELLGLPHANVARRTIAPRTVQKSFSVFIILMSFLIGLILLGITAKGNPPFIHLVFETISALSTVGVTANL  
 TPDGLKLALSVMPLMFMRIGPLTLFVSLADYHPEKKDMIHMKADISIGZ

65

MSDRITGILGLGIFGSSVLAALAKQDMNIAIDHAERINQFEPVLARGVIGDITDEELLRSAGIDTCDTVVVATGENLESS  
VLAVMHCKSLGVPTVIAKYKSQTAKKVLKIGADSVISPEYEMGQSLAQTLFHNSVDVFOLDKNVSIVEMKIPQSWAG  
QSLSKLDLRGKYNLILGFREQENSPLDVEFGPDDLKADTYLAVINNQYLDTLVALNSZ

5

MKLLSIAISSYNAAAYLHYCVESLVIGGEQVIGILIINDGSQDQTQEIACLASKYPNTVRAIYQENKCHGGAVNRGLVEAS  
GRYFKVVDSDDWDPRA YLKILETLQELESKGQEVDFVTNFVYEKEGQSRKKSMSYDSVLPVRQIFGWDQVGNFSK  
GQYTMHSLYRTDLLRASQFZ

10

MKFNPQRYTRWSIRRLSVGVASVVVASGFFVLVGQPSVVRADGLNPTPGQVLPEETSGTKEGDLSEKPGDVLTAQKP  
EGVTGNTNSLPTPTERTVSEETSPSSDLTLFEKDEEAQKNPELTDVLKETVDTADVDGTQASPAETTPEQVKGGVKEN  
TKDSIDVPAAYLEKAEKGPFAGVNVQIPYELFAGDGMRLRLLLKASDNAPWSDNGTAKNPALPPEGLTKGKYFYE  
VDLNGNTVGKQGOALIDQLRANGTQTYKATVKVYGNKDGKADL'INLVATKNVDININGLYAKETVQKAVADNVKDS  
15 IDVPAAYLEKAKGEGPFTAGVNHVPIYELFAGDGMRLRLLLKASDKAPWSDNGDAKNPALSPLGENVTKGQYFYQV  
ALDGNVAGKEKQALIDQFRANGTQTYSATVNVYGNKDGKPDLDNIVATKKTININGLISKETVQKAVADNVKDSIDV  
PAAYLEKAKGEGPFTAGVNHVPIYELFAGDGMRLRLLLKASDKAPWSDNGDAKNPALSPLGENVTKGQYFYQLALD  
GNVAGKEKQALIDQFRANGTQTYSATVNVYGNKDGKPDLDNIVATKKTININGLISKETVQKAVADNVKTVSMFQQP  
20 TZ

20

MKLKSYILVGYITSLTLLTILVVFVAVQKMLIAKGEIYFLGMTTVASLVGAGISLFLLLPVFTSLGKLKEHAKRVAADKDFP  
SNLEVQGPVEFQQLGQTFNEMSHDLQVSFDSLEESEREKGLMIAQLSHDIKTPTSQAATVEGILDGIIKESEQAHYLATIG  
RQTERLNLKVEELNFLTNTARNQVETTSKDSIFLDKLLIECMSEFQFLIEQERRDVHLQVIPESARIEGDYAKLSRILVN  
25 LVDNAFKYSAPTKLEVVAKLEKDQLSISVTDEGQGIAPEDLENIFKRLYRVETSRNMKTGGHGLGLAJARELAHQGG  
EITVSSQYGLGSTFTLVNLSGSENKAZ

25

MFGQTAQHGLTNSLKDFWIFLLNIGPQLAFFCQMLRCSRSEVEGQGTGNHRRREFNMIQQIFSHFGMTHLGQIKLVYQESID  
LELLVNALNHILLIDRLVLTNPQITIEDRQIVHGLDLLKGRKDKEDIKSMFRQLELASTQQICPINQVRVHHGILAFGEIS  
30 DLVPAKNLPNRQDZ

30

MEHLATYFSTYGGAFFAALGIVLAVGLSGMGSAYGVGKAGQSAALLKEQPEKFASALILQLLPGTQGLYGFVIGILW  
35 LQLTPELPLEKGVAYFFVALPIAVGYFSAKHQGNVAVAGMQILAKRPKEFMKGAILAAMVETYAILAFVVSFILTLRVZ

35

MLKSEKQSRYQMLNEELSFLLEGETNVLANLSNASALIKSRFPNTVFAGFYLFDGKELVLGPFQGGVSCIRIALGKGVC  
40 GEAAHFQETVIVGDVTTYLNYISCDLAKSEIVVPMKNGQLLGVLDLDSSEIEDYDAMDRDYLEQFVAILLEKTAWD  
FTMFEEKSZ

40

MSVLEIKDLHVEIEGKEILKGVNLTLTGTGEIAAIMGPNGTGKSTLSAAIMGNPNYEVTKEVLFDFGVNILELEVDERAR  
45 MGLFLAMQYPSIEPITNAEFLRAAMNAGKEDDEKISVREFITKLDEKMELNNMKEEMAERYLNEGFSGGEEKRNEIL  
QLLMLEPTFALLDEIDSGLDIDALKVVSXGVNAMRGEGFGAMITHYQRLNYYITPDVHVMMEGRVVLSGGPELAAR  
LEREGYAKLAELGYDYKEELZ

45

MPYKRQRSFSMALSKLDSL YMAVVAHDSKNPHHQKLEDAEQISLNNPTCGDVINLSVKFDAEDRLEDIAFLNSGCTIS  
50 TASASMMTDAVLGKTKQEILELATIFSEMVGQKQDERQDQLGDAAFLSGVAKFPQRIKCATLAWNALKKTIENTEQEQZ

50

MKIQDLLRKDVMLLDLQATEKTAVIDEMIKNLTDHGYVTDFFETKEGILAREALTSTGLGDGIAMPHSKNAAVKEATV  
55 LFAKSNKGVYESLDGQATDLFFMIAAPEGANDTHLAALAEISQYLMKDGAFADKLQATSADQVIELFDQASEKTEEL  
VQAPANDSGDFTVAVTACTTGIAHTYMAQEALQKYAAEMGVGKIVETNGASGVGNQLTAEDIRKAKAIIAADKAVEM  
DRPDGKPLINRPVADGIRKTEELINLALSGDTEVYRAANGAKAATASNEKQSLGGALYKHLMSGVSQMLPFVIGGGIMI  
ALAFIDGALGVPNENLGNLGSYHELASFMKIGGAAGFLMLPVFAGYVAYSIAEKPLVAGFVAGAJAKEGFAFGKIP  
YAAGGEATSTLAGVSSGFLGALVGGFIAGALVLAIKKYVKVPRSLEGAKSILLPLLGTLTGFMVLAVNIPMAAINTAM  
60 NDFLGGGLGGGSAVLLGIVLGGMMAVDMGGPVNKAAYVFGTGLAATVSSGGSVMAAAVMAGGMVPPLAIFVATLLF  
KDKFTKEERNGLTNIIMGLSFTTEGAIPFGAADPARAIPSFILGSAVAGGLVGLTGDKLMAHPHGGIFVIALTSNALLYLVS  
VLVGAFVSGVVYGYLRKPQAZ

60

MANKNTSTTRRRPSKAELERKEAIQRMILISLGIALLIFAAFKLGAAAGITLYNLIRLLVGSLAYLAIFGLLYLFFFKWIRK  
65 QEGLLSGFFTIFAGLLIFEAYLVWYGLDKSVLKGTMAQVVTDLTGFRITTSFAGGGGLIGVALYIPTAFLFSNIGTYFIGS

65

- 5 ILILVGSLLVSPWSVYDIAEFFSRGFAKWWEGHERRKEERFVKQEEKARQKAEKEARLEQEETEKALLDLPVDMETGE  
ILTEEAQVNLPPPEEKWVEPEIILPQAEKFFPEQEDDSODEDVQVDFSAKEALEYKLPQLFAPDKPKDQSKKEKIVRE  
NIKILEATFASFGIKVTVERAEIGPSVTKEYEKPAGVVRVNRISNLSDDLALALAAKDVRIEAPIPGKSLIGIEVPNSDIATV  
SFRELWEQSQTAKAENFLEIPLGKAVNGTARAFDLSKMPHLLVAGSTGSGKSVAVNGIASILMKARPDQVKFMMVDPK  
MVELSUYNDIPHLLIPVVTNPRKASKALQKVVDENRYELFAKVGVRNIAGFNAKVEEFNSQSEYKQIPLPFIVVTVE  
LADLMMVASKEVEDAIIRLGQKARAAAGIHMILATQRPVSDVISGLIKANVPSRVAFVSSGTDSTRTILDENGAEKLLGRG  
DMLFKPIDENHPVRLQGSFISDDVERIVNFUKTQADADYDESFDPGEVSENEGEFSGDAGGDPLFEEAKSLVIETQKA  
SASMIQRRLSVGFNRATRLMEELEIAGVIGPAEGTKPRKVLQQZ
- 10 MSYFKKYYFKDSQFKLGMRTFKTGIAVFLVLLIFGFFGWKQLQIGALTAVFSLRESFDES VHFGTSRILGNSIGGLYALV  
FFLLNTFFHEAFWVTLVVVPICMTLIMTNVAMNNKAGVIGGVAAMLITLSIPSGETILYVVRVLETFMGVFVAIVN  
YDIDRIRLFLEKKEKZ
- 15 MNKSEHRHQILRALITKNKIHTQAEQLALLAENDIQVTQATLSRDIKNMNLKSVREEDSAYVVLNNGSISKWEKRLLEY  
MEDALVWMRPVQHQLKTLPLGLAQSGSIIDTSLFPDAIATLCGNDVCLICEDADTAQKCFEELKKFAPPPFFEEZ
- 20 MKSIKLNALSVMGIRVLNIIIPILTGTYVARVLDRTDYGYNFNSVDITLSFFLPFATYGVVNYGLRAISNVKDNKKDLNRT  
FSSLFYLCIACTILITAVYILA YPLFFTDNPIVKKVYLVMGIIQIAQIFSIEWVNEALENYSFLFYKTA FIRILMLVSIPLFVK  
NEHDIVYTLVMSLSTLINYLISYFWIKRDIKLVKIHLSDFKPLFLPLTAMLV PANANMLFTFLDRLFLVKTGIDVNVSY  
YTIAQRIVTVIAGVVTGAIGVSVPRLSYYLGKGDKEAYVSLVNRGSRIFNFIPLSFGLMVLGPNAILLYGSEKYGGGIL  
25 TSLFAFRITLALDTILGSQILFTNGYEKRITVTVFAGLLNLGLNLSLLFFNHIVAPEYLLTTLMLSETSLVFIIFIRKQL  
IHLGHIFSYTVRYSLSFVAVYFLINFPVDMVINLPLINTGLIVLLSAISYISLLVFTKDSIFYEFLNHVLA LKKNFKK  
SZ
- 30 MELFMKITNYEIKLKKSGLTNQILKVLEYGENVDQELLGDIADISGCRNPVFMERYFQIDDAHLSKEFKQKPSFSIL  
DDCYPWDLSEIYDAPVLLFYKGNLDLLKFPKAVVGSRAKSKQGAKSVEKVIQGLENELVTVSGLAKGIDTA AHMAAL  
QNGGKTIAVIGTGLDVFPKANKRLQDYIGNDHLVLSYGPGEQPLKFHFPARNRIAGLCRGVTVABAKMRSGSLTCE  
RAMEEGRDVFAIPGSILDGLSDGCHHLIQEGAKLVTSQGDVLAEEFFZ
- 35 MKQLTVEDAKQIELEILDYIDTLCKKHNNYIINYGTLGIAVRHEGFIPWDDIDLSMPREDYQRFINIFQKEKSKYKLLS  
LETDKNYFNFIKITDSTTKIIDTRNTKTYESGIFIDIFIDRDPKVIDTCYKLESFKLLSFSKHKNTVYKDSLLKDWIRT  
AFWLLLRPVSPRYFANKIEKIQYSRENGQYMAFIPSKFKEKEVFPSTGTFDKTIDL PFENLSLPAEKFDITLTQFYGDY  
MTLPPEEKRFYSHEFHAYKLEDZ
- 40 MIKINHLTITQNKDLRDLVSDLTMTIQDGEKVAJGEEGNGKSTLLKILMGEALSDFTIKGNIQSDYQSLAYTPQKVPEDL  
KKKTLDHYFFLDSIDLDSILYRLAEELHFDNRFASDQEIGNLSGGEALKIQLIHELAKPFEILFLDEPSNDLDLETVDW  
LKGOIQKTRQTVIFISHDEDFLSETADTIVHLRLVKHRKEATLVEHLDYDSYSEQRKANFAKQSQQAANNQRAYDKT  
MEKHRRVKQNVETALRATKDSAGRLAKKMKTVLSQEKRYEKAQSMQKPLEEEQIQLFFSDIQPLPASKVYLQLE  
45 KENLSIDDRVLVQKLQTLVRGQEKIGIIPNGVGKSTLLAKLQRLNDKREISLGFMPODYHKKLQLDLSPIAYLSKTGE  
KEELQIQSHLASLNFSPMQHQIRSLSGGQGGKLLLLDLVLRKPNFLLDEPTRNFSPTSQPQIRKLFATYPGGLITVS  
HDDRFLKEVCSIYRMTEHGLKLVNLEDLZ
- 50 MKPKTFYNLLAEQNLPLSDQQKEQFERYFELLVEWNEKINLTAITDKEEVYKHFYDSIAPILQGLIPNETIKLLDIGAGA  
GFPSLPMKILYPELDVTIISLNRINFLQLLAQELDLNGVHFYHGRAEDFAQDKNFRAQYDFVTARAVARMQVLSLT  
IPYLKVGKLLALKASNAPEELLEAKNALNLLFSKVEDNLSYALPNRDPRTYTVVEKKKETPNKYPRKAGMPNKRPLZ
- 55 MSIKLJAVDIDGTLVNSQKEITPEVFSIAQDAKEAGVKVVIATGRPIAGVAKLLDDLQRLDEGDYVVTFNALVQETATG  
HEIISESLTYEDYLDMEFLSRKLGVMHMAITKDGIYANRNIGKYTVHESTLVSMPIFYRTPEEMAGKEIVKCMFIDEPEI  
LDAAIEKIPAEFYERYSINKSAPFYLELLKKNVDKGSATHLAEKLGLTDEMAIGDEENDRAMLEVVGPNVVMENG  
PEIKKIAKYITKTNDESGVAHAIRTWVLZ
- 60 MTWIIIGVIALIVFVIVSYNGLVKNRMQTKEAWSQIDVQLKRRNDLLPNLIETVKGYAKYEGSTLEKVAELRNQVAAA  
TSPAEMKASDALTRQVSGIFAVAESYPLKASANFVKLQEELTNTENKISYSRQLYNSVVSNNVVKLETFPSNLAGMF  
GFKAADFLQTPEEKSVPKVDFSGLDZ
- 65



[illegible]

DVAVYGHVHKQLLRYSQGGQIINPGSIGMPYFNWEALKNHRISQYAVIEVEDGELLNIQFRKVA YDYEAEELELAKSKG  
LPFIEMYEELRRDDNYQGHNLELLASLIEKHGYVEDVKNFDFLZ

- 5 MNVNQIVRIPTLKANNRKLNETFYIETLGMKALLEESAFLSLGDDQTGLEKLVLEEAPSMRTRKVEGRKKLARLIVKVE  
NPLEIEGILSKTDSIHLRYKQNGYA FEIFSPEDDILILHAEDDIASLVEVGKPEFQTDLASISLKFSEISMELHLPTDIESF  
LESSEIGASLDFTPAQQQDLTVDNVTWDL SMLKFLVNELDIASLRQKFESTEYFIPKSEKFFLGKDRNNVELWFEEVZ
- 10 MKWTKIHKIEEQIEAGTYPGASFA YKDNQWTEFYLGQSDPEHGLQTEAGLVYDLASVSKVVGVTCTFLWEIGOLD  
IDRLVIDFLPESDYDITIRQLLTHATDLDPFIPNRDLTAPELKEAMFHLNRRSQPAFLYSDVHFLLLGFILERIFNQDLD  
VILKQVVKPWGMMTETKFGPVELAVPTVRGVEAGIVHDPKARLLGRHAGSAGLFSTUKDLQIFLEHYLADDFARDLNO  
NFSPLDDKERSLAWNLEGDWLDHTGYTGTFIMWNRQKQEATIFLSNRTYEKDERAQWILDRNQVMNLIRKEEZ
- 15 MMKKTYNHILVWGVIFYSICIVCFCTPQEQSTVGVTGPIQHLGRLVFLTPFNSLWKLGEVSDIGQLCWIFLQNLNV  
FLFFPLIFQLLYLFPNLRKTKKVLFSFLVSLGIECTQLILDFFDFNRVFEIDDLWTNTLGGYLAWLLYKRLHKNKVRN  
Z
- 20 MKIPLLTFAHKKFVYVLLTLLFLALVYRDVLMTYFFFDIHAPDLAKFDGQAIKNDLLKSALDFRILQFNLFYQSFHPIII  
VLLGFQYIELKNKVLRLSIGREVSQGLKRLTLQVASIPCLYLVTVLIAUTYFFGTFSPLGWNLSFDGSGQLRLLDGE  
IKSYLFFTCVLLIGIFINAIYFLQIVDYVGNVTRSAITYLMLFLWLGSMLLYSALPYMVPMTSLMQASYGDVSLMKLFTF  
YLYIVPYMVLKEYEDNVZ
- 25 MFKVLOKVGKAFMLPIALPAAGLLLGIGGALSNTTIATYPILDNSIFQSIFQVMSSAGEVVFNSLSLLCVGLCIGLAKR  
DKGTAALAGVTGYLVMATIKALVKLFMAEGSAIDTGIGALVVGIVAVYLHNRYNNIQLPSALGFFGGSRFVPIVTSF  
SSILIGVFFVFWPPFQQLVSTGGYISQAGPIGTFLYGFMLRLSGAVGLHHIYPMFWYTELGGVETVAGQTVVGAQKIF  
30 FAQLADLAHSGLFTEGTRFFAGRFSTMMFGLPAACLAMHYSPKNRRKKYAGLFFGVALTSTFTGITEPIEFMFLFVSPV  
LYVYHAFLDGVSSFIADVLNISIGNTFSGGVIDFTLFGILQGNAKTNWVLQIPFGLIWSVLYYIIFRWFTITQFNVLTPGRGE  
EVDKSKEISEADSTNTADYLKQDSLQIIRALGGSNNIEDVDACVTRLRVAVKEVNQVDKALLKQIGAVDVLEVKGGIQ  
AIYGAKAILYKNSINEILGVDDZ
- 35 MKFRKLACTVLAGAAVLGLAACGNSGGSKDAKSGGDKAKTEITWWAFPVFTQEKTDGQGVGTYEKSIEAFEKANPDI  
KVKLETIDFKSGPEKITTAIEAGTAPDVLFDAPGRIIQYGGKGLAELNDLFTDEFVKDNNENIVQASKAGDKAYMYPI  
SSAPPYAMNKKMLEDAGVANLVKEGWTTDDFEKVLKALKDKGYTPGSLFSSGQGGDQGTAFISNLYSGSVTDKLV  
SKYTTDDPKFVKGLEKATSWIKDNLINNGSQFDGGADIQNFANGQTSYTLWAPAQNGIQAKLLEASKVEVVEVPPPSD  
40 EGKPALEYLVNGFAVFNKDDKKVAASKKFIQFADDEKWEKPKDVRTGAFVPTSFGKL YEDKRMETISGWTQYYSP  
YYNTIDGFAEMRTLWFPMLQSVSNGDEKPADALKAFTEKANETIKKAMKQZ
- 45 MQSTEKKPLTAFTVISTHLLLLTVLFIFFFYWILTGAFSQPDITVIPPQWPKMPTMENFQQLMVQNPALQWMWNSVFI  
SLVTMFLVCATSSLAGYVLAKKRFYQGRILFAIFIAAMALPKQVVLVPLVRIVNFMGIHDTLWAVILPLIGWPFQVFLM  
KQFSENIPTELLESAKIDGCGEIRTFWSVAFPIVKPGFAALAIPTINTWNYFMQLVMLTSRNNLTISLGVATMQAEMA  
TNYGLIMAGAALAAVPIVTVFLVFQKSFTQGITMGAVKGZ
- 50 MKIMFKNFNNILLNRKIVLLRIVLMMILINHLSTAVQKQDAVIFFKRELISIFSYNDYSEANLEIPKLLNLSLFMVGV  
LSVILLESDLADHYHHLIRYQSSFFDYTRKRLVVISKFFTQDLFVWFLGLLPLGIHFKTVALFFLLAQLMMLYLLSYLI  
ALISAGAGSFFLYFLAFVQGEWMDHIVTVYLVLSLLVMLIVSRLEEKFKKGZ
- 55 MGKGEMGKGVIGLEFDSEVLVNKAPTLQLANGKTATFLTQYDSKTLFAVDKEDIGQEIIGIAKGSIESMHNLPVNLG  
ARVPGGVNGSKAAVHEVPEFTGGVNGTEPAVHEIAEYKGSDSLVTLTTKKDYTYKAPLAQQALPETGNKESDLLASLG  
LTAFFLGLFTLGKKEQZ
- 60 MKKTFLLVLGLFCLLPLSVFAIDFKINSYQGDLYIHADNTAEFRQKIVYQFEEDFKGQIVGLGRAGKMPSGFDIDHPKI  
QAAKNGAELADVTSEVTEADGYTVRVYNPGQEGDIVEVDLVWNLKNLLFLYDDIAELNWQPLTDSSIESIEKFEFHVR  
GDKGAELFFHTGKLFREGTIEKSNLDYTRLDNLPAKRGVELHAYWPRTDFASARDQGLKGNRLEEFNKIEDSIVREK  
DQSKQLVTWVLP SILSISLLSVCFYFYRRKTPSVKYAKNHLRYEPPMELEPMVLSEAVYSTSLEEVSPLVKGAGKFTF  
65 DQLIQA TLDDVIDRGNVSIUSEGDAVGLRLVKEDGLSSFEKDCNLAFSGKKEETLSNLFADYKVSDSL YRRAKVSDEKR  
IQARGQLKSSFEVLNQMQEGVRKRVSVFGLPDYRPLTGGEKALQVGMGALTILPLFIGFGLFLYSLDVHGYLYLPL

PILGFLGLVLSVFYVWKLRLDNRDGVLEAGAEVYYLWTSFENMLREIARLDQAELESIVVWNRLLVYATLFGYADK  
VSHLMKVHQIQVENPDINLYVAYGWHSTFYHSTAQMSHYASVANTASTYSVSSGSGSSGGGFSGGGGGSGISAFZ

- 5 MKKVRKIFQKAVAGLCCISQLTAFSSIVALAETPETSIPAIGKVVIKETGEGGALLGDAVFELKNNTDGTTVSQRTEAQTG  
EAFSNSKPGTYTLTEAQPVPVGYKPKSTQWTVVEVEKNRRTTVQGEQVENREELSDQYPTGTYPDVQTPYQIUKVDGS  
EKNQGHKALNPNPYERVIPEGTLKSKRIYQVNNLDDNQYGIELTVSGKTVYEQKDKSVPLDVLVLLDNSNSMSNIRNKNA  
RRAERAGEATRSLDKITSSENVALVTYASTIFDGTFTVEKGVADKNGKRLNDSLFWNYDQTSFTTNTKDYSLKL  
10 TNDKNDIVELKNKVPTAEADHDGNRLMYQFGATFTQKALMKADEILTQQAQNSQKVIFHITDGVPTMSYPINFHAT  
FAPSYQNQLNAFFSKSPNKDGILLSDFTQTASGEHTIVRGDQSYQMFTDKTVYEKGAPAAFPVKPEKYSEMKAAGYA  
VIGDPINGGYTWNWRESILAYPFNSNTAKITNHGDPTRWYYNGNIAPDGYDVFTVGIGINGDPGTDEATATSMQSISS  
KPENYTNVTDTTKILEQLNRYFHTIVTEKKSIENTITDPMGELIDIQLGTDGRFPADYTLTANDGSRLENGQAVGGP  
QNDGGLLKNAKVLVDTEKRIYVTLGLTDEKVTLYNVRLNDEFVSNKFYDTNGRTTLHPKEVEQNTVRDFPIPKI  
15 RDVRKYPEITISKEKLGDIKFKVKNKDKPLRGAVFSLQKQHPDYPDIYGADQNGTYQNVRTGEDGKLTfKNLSDG  
KYRLFENSEPAGYKPVQNKPIVAFQIVNGEVRDVTISVQDIPAGYEFTNDKHYYTNEPIPPKREYPRTGGIGMLPFYLLG  
CMMMGGVLLYTRKHFPZ
- 20 MKSINKFLTMLAALLLTASSLFAATVFAAGTTTTSVTHKLLATDGDMDKIANELETGNYAGNKVGVLPANAKEIAG  
VMFVWNTNNEIDENGQTLGVNIDPQTFKLSGAMPATAMKKLTEAEGAKFNTANLPAAKYKIYEHSLSTVYGEDGA  
TLTGSKAVPIEIELPLNDVDAHVYPKNTEAKPKIDKDFKGANPDTPRVDKDTPVNHQVGDVVEYEIVTKIPALANYA  
TANWSDRMTEGLAFNKGTVKVTVDVALEAGDYALTEVATGFDLKLTDAGLAKVNDQNAEKTVKITYSATLNDKAI  
VEVPESNDVTFNNGNPDHGNTPKPNKPNENGDLTLTKTWVDAATGAPIGAEATFDLVNAQTGKVVQTVTLTDDKN  
25 TVTVNGLDKNTEYKFVERSICKYSADYQETTAGELAVKNWKENPKPLDPTPEKVVTYGKKFVKVNDKDNRLAGAEF  
VIANADNAGQYLARKADKVSQEEKQLVVTTKDALDRAVAAYNALTAQQQTQKEKEKVDKAAQYNAAVIAANNAF  
EWWADKDNENVVKLVSDAQGRFEITGLLAGTYYLEETKQPAYALLTSRQKFEVTATSYSATGQIEYTAGSGKDDAT  
KVVNKKITIPQTGGIGTIIFAVAGAAIMGIAVYAVKNNKDEDQLAZ
- 30 MTMQMKQKMISRIFFVMALCFLVWGAHAVQAQEDHTLVQLENYQEVVSQPSRDGHRLQVWKLDDSSYSYDDRV  
QIVRDLHSDWENKLSFFKKTSEMTFLENQIEVSHIPNGLYYVRSIIQTDVSYPAEFLFEMTDQTVPLVIVAKKTDTM  
TTKVKLIKVDQDHNRLLEGVGFKLVSVARDVSEKEVPLIGEYRYSQQVGRITLYTDKNGEIVFTNLPLGNYRFEKEVEPL  
AGYAVTTLDTDVQLVDHQLVTTTVNQKLPRGNVDFMKVDGRTNTSLQGAMFKVMKEESGHYTPVLQNGKEVVVS  
35 GKDGRFRVEGLEGYTYLWELQAPTGYVQLTSPVSFTIGKDKRELVTTVKNNKRPRIQVDPDTGEETLVYLDACCHVF  
VWZ
- 40 MSHIYLSIFTSLLLMLGLVNVAAQADEYLIGMEAAYPFNWTDQDDSDNGAVKIDGTNQYANGYDVQIAKKIAKDLGKE  
PLVVKTKWGLVLPALTSGKIDMIIAGMSPTAERKQELAFSSSYTSEPVLVKKDSAYASAKSLDDFNGAKITSQQGVYL  
YNLLAQIPGAKETAMGDFAQMRQALEAGVIDAYYSERPEALTAEAAANSKFKMIQVEPGFKTGEEDTAIAGLRKNDNR  
ISQINASIEITSKDDQVALMDRMKEQPAEATTTETSSSFQVAKILSENWQQLRGAGITLLISVGTIIGLIGLAIGVFR  
TAPLSENKVIYGLQKLVGWVYLVYIEIFRGTPMIVQSMVIYGTAAFGINLDRTLAAIFVTSINTGAYMTEIVRGGILAV  
45 DKQGFEAATALGMTHNQTMRKIVLPQVVRNLPATGNEFVINIKDTSVLNVISVVELYFSGNTVATQTYQFQTIIAV  
IYFVLTFTVTRILRFIERRMDMDTYTTGANQMOTEDLKZ
- 50 MTQAILEIKHLKKSQYQNEVLKDISLTVHKGEVISIIGSSGSGKSTFLRSINLLETPTDGOILYHGQNVLEKGYDLTQYREK  
LGMVQSFNLFENLVLENTIVAQTTLVKRERTEAEKIAKENLEKVGMGERYWQAKPKQLSGGQKQVIAIARALSMN  
PDAILFDEPTSLDPEMVGEVLKIMQDLAQEGLTMIVVTHEMEFARDVSHRVIFMDKGVAIEEGKPELFTNPKEDRTK  
EFLQRYLKZ
- 55 MKKYQLLFKISAVFSYLFVFSLSQLTLIVQNYWQFSSQIGNLFWIQNLSLLFIGVMIVVLVKTGHGYLFRIPRKKWLW  
YSILTVLVLFQISFNVQTAHVQSTAEQWAVLIGYSGTNFAELGIYIALFVLVPLMEELIYRGLLQHAFFKHRSRFGDLL  
LPSILFALPHFSSLPSLLDIFVFAVTVGIIFAGLTRYTKSIYPSYAVHVINNIVATFPFLLTFLHRLVGLZ
- 60 MNKKQWLGLGLVAVAAVGLAACGNRSSRNAASSSDVKTAAIVTDGGVDDKSFNQSAWGLQAWGKEHNLSKDN  
GFTYFQSTSEADYANNLQQAAGSYNLIIFGVGFALNNAVKDAAKEHTDLNYYLIDDVVKDQKNVASVTFADNESGYLA  
GVAAAATTKTKQVGFVGGIESEVISRFEAGFKAGVASVDPSIKVQVDYAGSFGDAAKGTIAAAQYAGADIVYQVAG  
GTGAGVFAEAKSLNESRPNKVVVIGVDRDQEAEGKYTSKDGKESNFVLVSTLKQVGTTVKDISNKAERGEFFGGQV  
IVYSLKDKGVDLAVTNLSEEGKKAVEDAKAKILDGSVKVPEKZ

- 5 MSKKLQQISVPLISVFLGILLGAIVMWIFGYDAIWGYEELFYTAFGSLRGIGEIFRAMGPLVLIGLGFAYASRAGFFNVGL  
PGQALAGWILSGWFALSHPDMPRLMILATIVIALIAGGIVGAIPGILRAYLGTSEVIVTMMNYIVLYVGNAFIHAFFKD  
FMQSTDSTIRVGANATYQTPWLAELTGN SRMNIGIFFAIIA VAVIWFMLKKTTLGFEIRA VGLNPHASEYAGISAKRTIL  
SMISGALAGLGGAVEGLGTFQNVVYVQSSLAIGFNGMAVSLAANSPIGILFAAFLFGVLQVGAPGMNAAQVPSELVSI  
VTASIIFFSVHYLIERFVKPKKQVKGKZ
- 10 MGVKKKLKLTSLLGLSLDMTACATNGVTS DITAESADFW SKLVYFFAEIIRFLSFDISIGVGILLFTVLIRTVLLPVFQVQ  
MVASRKMQEAQPRIKALREQYPRDMESRTKLEQEMRKVFKEMGVRQSDSLWPILIQMPVILALFQALSRVDFLKTH  
FLWINLGSVDTTLVLPILAAVFTFLSTWLSNKALSERNGATTAMMYGIPVLIFAVYAPGGVALYWTVSNA YQVLQTY  
FLNNPFKIAEREA VVQAQKDL ENRKAKKKAQKTKZ
- 15 MVIDPFAINELDYLVSHFSDHIDPYTAAAILNNPKLEHV KFIGPYHCGRIWEGWGVPKERIVV KPGDTIELKDMKIH  
AVESFDR TCLVTL PVNGADETGGELAGLA VTDEEMAQKAVNYIFETPGGTIYHGADSHFSNYFAKHGKDFKIDVALNN  
YGENPVGIQDKMTSIDLLRMAENLRTKVII PVHYDIWSNFMAS TNEILELWKMRKDRLQYDFHPFIWEVGGKYTPQD  
QHLVEYHHPRGFDDCFEQDSNIQF KALLZ
- 20 MFLSGWLSSFANTYTHDLLGVLPD SPFLNAFESAIAAPLVEEPLKLLSLVFVLA LIPVRKLSLFLGLIASGLGFQMIKDI  
GYIRTDLP EGDFFTSIRLERIUSGIASHWTFSGLA VVG VYLLYRA YKGQKVGKKQGLIFLGLALGTHFLNPSPFVELETEL  
PLAIPVVTALALYGFYHAYCFVEKHNE LMTZ
- 25 MKVEPRCDVLSRMSHFFIRILIMELQELVERSWAIRQAYHELEVKHDSKWTVEEDLLALSNDIGNFQRLVMTKQGRY  
YDETPYTLEQKLSENIWWLELSQRLDIDILTEMENFLSDKEQLNVRTWKZ
- 30 MLDWKQFFLAYLRSRSLFYLLSLAFLVLLFQFLFASLGIFYLYFFFLCCFVTILFFTWDILVETQVYRQELLYGEREAK  
SPLEIALAEKLEAREMELYQQRSKAERKLTDLDYTLVWHQIKTPIAASQLLVAEVVDRQLKQQLQEIQFIDSYTNLV  
LQYLRLESFHDDLVLKQVQIEDLVKEIIRKYALFFQKGLNVNLHDLDKEIVTDKKWLLVVIEQHSNLSKYTKEGGLEIY  
MDDQELCTKDTGIGIKNSDVL RVFERGFGYNGRLTQSSGLGLYLSKKISEELGHQIRIESEVGKGTTVRQFAQVNLVL  
EZ
- 35 MELNTHNAEILLSAANKSHYPQDELPEIALAGRSNVGKSSFINTMLNRKNLARTSGKPGKTQLLNFNIDDKMRFDVP  
GYGYARVSKKEREK WGCMIIEYLTTRENLRV VSVLVDLRHDP SADDVQMYEFLKYIEIPVITATKADKIPRGKWNKH  
ESAIKKLNFDPSDDFILFSSVSKAGMDEAWDAILEKLZ
- 40 MTKKQLHLVIVTGMMSGAGKTVAIQS FFDLG YFTIDNMPPALLPKFLQLVEIKEDNPKLALVDMRSRFFSEIQAVLDEL  
ENQDGLDFKILFLDAADKELVARYKETRRSHPLAADGRILDGKLERELLAPLKNMSQNVVDTTELTPRELKTLAEQF  
SDQEQAQSFRIEVMSFGFKYGIPIDADLVDFVRFLPNPYLP ERLNQTGVDEPVYDYVMNHPESEDFYQHLLALIEPILP  
SYQKEGKSVLTIAMGCTGGQHRSVAFAKRLAQLDSKNWSVNEGHRDKDRRKETVNR SZ
- 45 MRKPKITVIGGGTGSPVILKSLREKDV EIAAIVTVADDGSSGELRKNMQQLTPPGDLRNVLVAMSDMPKFYEKVFQYR  
FSEDAGAFAGHPLGNLIIAGLSEM QGSTYNAMQLLSKFFHTTGKIYPS SDHPLTHAVPQDGTEVAGESHIVDHRGIIDN  
VYVTNALND DTPLASRRV VQTILES DMIVLPGSLFTSILPNIVIKEIGRALLETKAEIAYVCNIMTQRGETEHFTDSOHV  
EVLHRLGRPFIDTVLVNIEKVPQEYMNSNR FDEYLQVEHDFVGLCKQVSRVSSNFLRLENGGA FHGDGLIVDELMR  
IQVKKZ
- 50 MKNLKLIIIRLIVNLADSVFYTV ALWHVSNNYSSMFLGIFAVNYLPD LLIFFGPVIDRVNPQKILII SILVQLAVAVIFL  
LLLNQISFWVIMSLVFISVMASSISYVIEDVLPQVVEYDKIVFANSLFSISYKVLDSIFNSFASFLQVAVGFILLVKIDIGIFL  
LALFILL LLLKFRTSNANIENFSFKYKREVLQGT KFILNNKLLFKTSISLT LINFFYSFQTVVVPISIRYFDGPIFYGIFLTA  
GLGGILGNMLAPIVIKYLSNQIVGVFLFLNGSSWLVAIVIKDYTL SLJLFFVCFMSKG VFNINFSLYQQIPPHQLLGRVN  
TTDISISFGMPIGSLVAGTLIDLNIELVLIASIPYFLFSYIFYTDNGLKEFSIYZ
- 60 MMSNKNKEILIFAILYTVLFMFDGVKLLASLMP SAIANLYVYVVLALYGSFLFKDRLIQQWKEIRKTKRKKFFGVLTGW  
LFLILMTVVFEFVSEMLKQFVGLDGQGLNQSNIQSTFQEQPLLIAVFACVIGPLVEELFFRQVLLHYLQERLSGLLSIIL  
GLVFALTHMHSALSEWIGAVGYLGGGLAFSIIYVKEKENIYPLL VHMLSNSLSLIIAISTVKZ
- 65

- 5 LKXPIEFKNVSKVFEDSNTKVLKDNFELEEGKFYTLGASGSGKSTILNIIAGLLDATTGDIMLDGVRINDIPTNKRDVH  
TVFQSYALFPHMNVFENVAFPLRLRKIDKKEIEQVVAEVLKMOVQLEGYEKRSIRKLSGGQRQVVAIARAIIQPRVVLDD  
EPLSALDLKLRDTMQYELRELQQRLLGITFVFTVDQEEALAMSDWIFVMNDGEIVQSGTPVDIYDEPINHFVATFIGESN  
ILPGTMIEDYLVEFNGKRFEAVDGGMKPNPVEVVIRPEDLRITLPEEGKLQVKVDTQLFRGVHYEIIAYDELGNEMMI  
HSTRKAIVGEEIGLDFEPEDIHIMRLNETEEEFDAIEEYVEIEEQEAGLINAIEEERDEENKLZ
- 10 MKSMRILFLLALIQISLSSCFLWKECILSFKQSTAFFIGSMVFVSGICAGVNYLYTRKQEVHSLASKSVKLFYSMLLLIN  
LLGAVLVLSNDLFIKNTLQQELVDFLLPSFFFLGDLFLPLKKYVRDFLAMLDRKXTVLVTLATLLFLRNPMTTIVSL  
LIYIGLGLFFAAYLVPNSVKKEVSFYGHIFRDLVLVITVLFFZ
- 15 MYKKIIGMVLALLSVTVVGGVFAITTYQQGTETLAKTYKKIGEETKVIEATEPLTILLMGVDTGNVERTETVWGRSDS  
MILMTVNPKTKTMMSLERDILTRIESGNGQAHEAKLSAYADGGAELAIETIQKMMNIHIDRYVMVNMGRGLQKL  
DAVGGITVNNILGFPISISDQEEFNTISIGVGEQHIGGEEALVYARMRYQDPEGDYGRQKRQREVIQKVMKALSLSIGH  
YQELKALSDNMQTNIDLSAKSIPNLLGYKDSFKTETQQLQGEILQGVSYQIVSRAHMLEMQNLLRRSLGQEEVTQL  
ETNAVLFEDLFGRAVPGDEDNZ
- 20 MKKQAYVIALTSFLVFFFSHSLLEILDFFDWSIFLHDVEKTEKFVFLLLVFSMSMTCLLALFWRGIEELSLRKMQANLK  
RLLAGQEVVQVADPDLASFKSLSGKLNLLTEALQKAENQSLAQEEEEIEKERKRIARDLHDTVSQLFAAHMILSGISQ  
QALKLDREKMQTQLQSVTAILETAQKDLRVLLHLRPVELEQKSLIEGIIILLKELEDKSDLRVSLKQNMTKLPKKIEEH  
FRILQELISNTLRHAQASCLDVLYQTDVELQLKVVDNGIGFQLGSLDLSYGLRNIKERVEDMAGTVQLLTAPKQGLA  
25 VDIRIPLDKEZ
- 30 MIVSISQGFVWAILGLGIFMTFRILNFPDMTTEGSFPLGGAVAVTLITKGVNPFATLVAVGAGCLAGMAAGLLYTKGK  
IPTLLSGILVMTSCHSMLIMGRANLGLLGTQKIQDVLFPDSDLNQLLTGLIFVSIVIALMLFFLDTKLQQAIIATGDNP  
DMARSPGIHTGRMELMGLVLSNGVIALAGALIAQQEGYADVSRGIVVIVGLASLIIGEVIFKSLSLAERLVTVVGSIA  
QFLVWAVIALGFNTSYLRLYSALLAVCLMIPTFKQITLKGAKLSKZ
- 35 MKMKVWSTVLTATGVALTTLAACSGGSNSTTASSSEKADKSQELVIYSNSVSNRGDWLTAKAKEAGFNIKMVDIAG  
AQLADRVIAEKNNVADMVFGIGAVDSNKIRDQKLLVQYKPKWLDKIDQSLSDKDNYYNPVIVQPLVLIGAPDVKEMP  
KDWTELGSKYKGKYSISGLQGGTGRAILASILVRYLDDKGELGVSEKWEVAYKEYLKNAYTLQKGESSIVKMLDKEDPI  
QYGMWVGSGALVGQKEQNVVFKVMTPEIGVPFVTEQTMVLSTSKKQALAKEFIDWFGQSEIQVEYSKNFGSIPANKD  
40 ALKDLPEDTKKFVDQVKPQNIWAEVGHLDWEVKEALEYVQZ
- 45 MIKFDNIQIKYGFVAIDNLNLDIHEGEFFTLGPSGCGKSTTLRALVGFLDPSSGSIEVNGTDVTHLEPEKRGIGIVFQSY  
ALFPTMTVFDNIAFGLKVKVAPDVIAKVSAAKIKISDQQLQRNVSELSGGQQQRVALARALVLEPKILCLDEPLS  
NLDALRVDLRKELKRLQKELGITTLVYTHDQEEALTSDRIVFNNGYIEQVGTPEIYHNSQTEFVCDFIGDINVLTD  
ETVHEVLLKNTSVFLEDKKGYIRLEKVRFRNRETEQDFILKGTIIDVEFSGVTHYTIKVSQILNVTSIDSQAAIRS VGESV  
ELFITPSDVLQFZ
- 50 MRHKLNLKDWLIRLGLIWLFLVTIIPNFDLVVNVFVKGGEFSLDAVHRVLKSQRALQSIMNSFKLAFSLITVNVVGIL  
CVLFTIEYFDKGAIKLGYMTSLIYGGVVLTATGYKFVYGPYGLITKFLQNVIPSLDPNWFYGYAVLFIMTFSGTANHT  
LFLTNTIRSVDYHTIEAARNMGAKPFTVFRKVVLPITLPTLFTIMVFLSGLSAVAPMIVGGKEFQTNPMITTFAGMG  
NSRDLAALLAILGIATITLLTIMNKIEKGGNYISISKTKAPLKKQKASKPWNIIAHIVAYGLFTVFMPLIFIVLYSTDPV  
AIQTGNLTLNFTLENYRLFPSNSAASFPLVSFIYSIIAATTILAVVFARVVRKHKS RFDLFEYGALLPWLLPTLLA  
VSLFTFNQPPQLVLNQILVGSLLVILLAYIVVKIPFSYRMVRAILFSVDEMEDAARS MGASPFYTMKVIIPFILPVVLS  
VIALNFNSLLTDFDLSVFLYHPLAQPLGITIRSAGDETATSNALVVFYITVLMISGTVLVYFTQRPGRKVRKZ

Table 3

ID201 - 4106.4

5 ATGATAAAAAATCCTAAATTATTAACCAAGTCTTTTTAAGAAGTTTTGCAATTCTAGGTGGTGTGGTCTAGTCAT  
TCATATAGCTATTTATTTGACCTTTCTTTTATATATCAACTGGAGGGGAAAAAGTTAATGAGAGCGCAAGAG  
TGTTTACGGAGTATTTAAAGACTAAGACATCTGATGAAATTCAGCTTACTCCAGTCTTATTCAAAGTCTCTTGACC  
10 ATATCTGCTCACCTTAAAAGAGATATTGTAGATAAGCGGCTCCCTCTTGTCATGACTTGGATATTAAGATGGAAA  
GCTATCAAATTATATCGTGATGTTAGATATGTCTGTTAGTACAGCAGATGGTAAACAGGTAACCGTGCAATTTGTTT  
ACGGGGTGGATGTCTACAAAGAAGCAAAGAATATTTGCTTTTGTATCTCCATATACATTTTTGGTTACAATTGCT  
TTTTCTTTGTTTTTCTTATTTTATACTAAACGCTTGCTCAATCCTCTTTTTTACATTCAGAAGTGAAGTAGTAA  
AATGCAAGATTTGGATGACAATATTCGTTTTGATGAAAGTAGGAAAGATGAAGTTGGTGAAGTTGAAAAACAGATTA  
ATGGTATGTATGAGCACTTGTGGAAGGTTATTTATGAGTTGGAAAGTCGTAATGAGCAAATTTGAAAAATGCAAAAT  
15 CAAAAGGTTTCTTTGTCGCGGAGCATCACATGAGTTGAAAACCCCTTTAGCCAGTCTTAGAATTATCCTAGAGAA  
TATCAGCATAATATTGGAGATTACAAAGATCATCCAAATATATTGCAAAGAGTATAAATAAGATTGACCAGATGA  
GCCACTTATTAGAAGAAGTACTGGAGTCTTCTAAATTCAGAGTGGACAGAGTGTCTGAGACCTTGACTGTTAAG  
CCAGTTTTAGTAGATATTTATCAGTTATCAAGAATTAGCTCATTCAATAGGTGTTACAATTGAAAAATCAATTGAC  
AGATGCTACCAGGGTGTCTAGTCTTAGGGCATTGGATAAGGTTTGGACAAACCTGATTAGTAATGCAATTAAAT  
20 ATTCAGATAAAAAATGGCGGTGTAATCATATCCGAGCAAGATGGCTATCTCTCTATCAAAAATACATGTGCGCCTCTA  
AGTGACCAAGAACTAGAACATTTATTTGATATATTCTATCATTCTCAAATCGTGACAGATAAGGATGAAAGTTCCGG  
TTTGGGTCTTTACATTGTGAATAATATTTAGAAAGCTATCAATGGATTATAGTTTTCTCCCTTATGAACACGGTA  
TGGAATTTAAGATTAGCTTGTAG

25 MIKNPKLLTKSFLRSFAILGGVGLVIHIAIYLTFFYYIQLEGEKFNESARVFTEYLKTKTSDEIPSLLOSYSKSLT  
ISAHLKRDIVDKRLPLVHDLDIKDGKLSNYIVLDMSVSTADGKQVTVQFVHGVVDVYKEAKNILLLYPLPTFLVTIA  
FSFVFSFYFTRKLLNPLFYISEVTSKMQDLDDNIRFDES RKDEVGEVGKQINGMYEHLKLVIELESRNEQIVKLQN  
QKVSFVRGASHELKTPLASLRILENMQHNIGDYKDHPIYAKSINKIDQMSHLLLEZVLESSKFQEWTECRETLTVK  
PVLVDILSRYQELAHSIGVTIENQLTDATRVVMSLRALDKVLNLI SNAIKYSDKNGRV IISEQDGYLSIKNTCAPL  
30 SDQLEHLFDIFYHSQIVTDKDESSGLGLYIVNNILESYQMDYSFLPYEHGMEFKISLZ

ID202 - 4106.9

35 ATGGATAAAATTATTA AAACTATATCAGAAAGCGGAGCCTTTCTGCTTTTGTCTTGATAGCACTGAAACCGTCCG  
CACTGCTCAAGAAAAACATCAAACCAAGCTAGCTCAACTGTAGCGCTTGGTCGAACCTCTTATCGCTAGCCAGATT  
TCGCAGCCAATGAAAAAGGAAATACCAAACCTTACAGTTAAGGTGTTGGGATCTAGCTCTCTAGGTGCTATTATCACC  
GTCGCTGATACCAAGGGGAACGTCAAAGGCTATGTTCAAATCCTGGTGTGACATCAAAAAGACTGCGACTGGTGA  
AGTCTAGTCCGACCTTTTGTGGAAATGGTCAATTCCTCGTTATCAGAGTACCGTACTGGAAATCCTTACAAC  
40 CTATAACTCCCCCTCATCTCTGGAGAAATCGGTGAAGACCTTGCTTTTACCTTACTGAAAGCCAACAACCGCTTCA  
GCGGTGCGCCTCAATGTCTTTTGGACGAGGAAGACAAGGTCAAGGTTGAGGTGGTTTCTAGTTCAAGTCTTGCC  
AGGAGCCAAGAAAGAAGAGATTGCTCGCTTTGAAAAACGCATCCAAGAAATGCCAGCTATCTCTACTCTTCTCGAAA  
GCGACGACCATATCGAAGCCCTCTCAAGGCTATCTACGGGGACGAAGCCTACAAGCGTCTTTCTGAAGAAGAAATC  
CGTTTCCAATGTGACTGTAGCCATGAACGCTTTATGAACGCTCTTGCCAGCTTCCAAGCTCAGACTTACAGGAAAT  
45 GAAAGAGGAAGACCACGGGGCAGAAATCACTTGTCAATTCTGCCAAACTACTTACAACTTTGATGAAAAGGACCTGG  
AGGAACTCATTGCTGACAAATCTTAA

50 MDKI IKTISEGAFRAFLVDSTETVRTAQEKHQTOASSTVALGRTLIA SQILAANEKGNKLT VKVLGSSSLGAIIT  
VADTKGNVKG YVQNPVDIKKTATGEVLVGPVFNQGFVITDYGTGNPYNISITPLISGEIGEDLAFYLTESQOTPS  
AVGLNVLLEDEEDKVKVAGGFVQVLP GAKKEI IARFEKRIQEMPAISTLLESDDHIEALLKAIYGD EAYKRLSEEEI  
RFQDCDSHERFMNALASLPSSDLQEMKEEDHGAEITCQFCQTTYNFDEKDL EELIRDKSZ

ID203 - 4115

55 ATGAAATCAATAACTAAAAAGATTAAAGCAACTCTTGCAAGGAGTAGCTGCCTTGTGTCAGTATTGCTCCATCATT  
TGTATCTGCTCAAGAATCATCAACTTACACTGTTAAAGAAGGTGATACACTTTCAGAAATCGCTGAAACTCACAACA  
CAACAGTTGAAAAATTGGCAGAAAACAACCATTTGATAACATTCATTTGATTTATGTTGATCAAGAGTTGGTTATC  
GATGGCCCTGTAGCGCTGTTGCAACACCAGCGCCAGCTACTTATGCGGCACCAGCGCTCAAGATGAAACTGTTTC

AGCTCCAGTAGCAGAACTCCAGTAGTAAGTGAAACAGTTGTTTCAACTGTAAGCGGATCTGAAGCAGAAGCCAAAG  
AATGGATCGCTCAAAAAGAATCAGGTGGTAGTATACAGCTACAAATGGACGTTATATCGGACGTTACCAATTAA

5 MKSITKKIKATLAGVAALFAVFAPSFVSAQESSSTYTVKEGDTLSEIAETHNTTVEKLAENNHIDNIHLIYVDQELVI  
DGPVAPVATPAPATYAAPAAQDETVSAPVAETPVVSETVSTVSGSEAEKEWIAQKESGGSIQLQMDVISDVTNZ

ID204 - 4117.1

10 ATGAATTTAGGAGAATTTTGGTACAATAAAATAAAGAACAGAGGAAGAAGGTTAATGAAGAAAGTAAGATTTAT  
TTTTTACGCTCTGCTATTTTCTTAGCTAGTCCAGAGGGTGCAATGGCTAGTGATGGTACTTGGCAAGGAAAACAGT  
ATCTGAAAGAAGATGGCAGTCAAGCAGCAAAATGAGTGGGTTTTTGATACTCATTATCAATCTTGGTTCTATATAAAA  
GCAGATGCTAACTATGCTGAAAATGAATGGCTAAAGCAAGGTGACGACTATTTTACCTCAAATCTGGTGGCTATAT  
15 GGCCAAATCAGAAATGGGTAGAAGACAAGGGAGCCTTTTATTATCTTGACCAAGATGAAAAGATGAAAAGAAATGCTT  
GGGTAGGAACCTTCTATGTTGGTGCAACAGGTGCCAAAGTAATAGAAGACTGGGTCTATGATTCTCAATACGATGCT  
TGGTTTTATATCAAAGCAGATGGACAGCACGACAGAAAGAATGGCTCCAAATTAAGGGAAGGACTATTATTTCAA  
ATCCGGTGGTTATCTACTGACAAGTCAGTGGATTAATCAAGCTTATGTGAATGCTAGTGGTGCCAAAGTACAGCAAG  
GTTGGCTTTTGGACAAACAATACCAATCTTGGTTTTACATCAAAGAAAATGGAACATGCTGATAAAGAAATGGATT  
20 TTCGAGAATGGTCACTATTATTATCTAAAATCCGGTGGCTACATGGCAGCCAATGAATGGATTGGGATAAGGAATC  
TTGGTTTTATCTCAAATTTGATGGGAAAATGGCTGAAAAGAATGGGTCTACGATTCTCATAGTCAAGCTTGGTACT  
ACTTCAAATCCGGTGGTTACATGACAGCCAATGAATGGATTGGGATAAGGAATCTTGGTTTTATCTCAAATCTGAT  
GGGAAAATAGCTGAAAAGAATGGGTCTACGATTCTCATAGTCAAGCTTGGTACTACTTCAAATCCGGTGGTTACAT  
GACAGCCAATGAATGGATTGGGATAAGGAATCTTGGTTTTACCTCAAATCTGATGGGAAAATAGCTGAAAAGAAT  
25 GGGTCTACGATTCTCATAGTCAAGCTTGGTACTACTTCAAATCTGGTGGCTACATGGCGAAAATGAGACAGTAGAT  
GGTTATCAGCTTGGAAAGCGATGGTAAATGGCTTGGAGGAAAACACTACAAATGAAAATGCTGCTTACTATCAAGTAGT  
GCCTGTTACAGCCAATGTTTATGATTGAGATGGTGAAGCTTTCTCTATATATCGCAAGGTAGTGTCTGATGGCTAG  
ATAAGGATAGAAAAGTGATGACAAGCGCTTGGCTATTACTATTTCTGGTTTGTGAGGCTATATGAAAACAGAAGAT  
TTACAAGCGCTAGATGCTAGTAAGGACTTTATCCCTTATTATGAGAGTGATGGCCACCGTTTTTATCACTATGTGGC  
30 TCAGAAATGCTAGTATCCAGTAGCTTCTCATCTTTCTGATATGGAAGTAGGCAAGAAATATTATTCGGCAGATGGCC  
TGCATTTTGATGGTTTTAAGCTTGAGAATCCCTTCCTTTCAAAGATTTAACAGAGGCTACAACTACAGTGTGAA  
GAATTGGATAAGGTATTTAGTTTGCTAAACATTAACTAGCCTTTGGGAGAACAGGGCCCTACTTTAAGGAAGC  
CGAAGAACATTACCATATCAATGCTCTTTATCTCCTTGGCCATAGTGCCCTAGAAAGTAAGTGGGGAAGAAATGAAA  
TTGCCAAAGATAAGAATAATTTCTTGGCATTACAGCCTATGATACGACCCCTTACCTTTCTGCTAAGACATTTGAT  
35 GATGTGGATAAGGGAATTTTAGGTGCAACCAAGTGGATTAAGGAAAATATATCGATAGGGGAAGAACTTTCTTGG  
AAACAAGGCTTCTGGTATGAATGTGGAATATGCTTCAGACCCTTATTGGGGCGAAAAAATGTAGTGTGATGATGA  
AAATCAATGAGAAGCTAGGTGGCAAAGATTAG

40 MNLGEFWYNKINKNRGRRLMKVRFIFLALLFFLASPEGAMASDGTWQKQYLYKEDGSQAANNEWVFDTHYQSWFYIK  
ADANYAENEWLKQDDYFYLSGGYMAKSEWVEDKGFYLLDQDGKMKRNWVGTSTYVGATGAKVIEDWVYDSQYDA  
WFYIKADGQHAKEWLQIKGKDYFFKSGGYLLTSQWINQAYVNASGAKVQQGWLFDKQYQSWFYIKENGNYADKEWI  
FENGHYYYLKSAGGYMAANEWIWDKESWFLKFDGKMAEKWVYDSHSQAWYFFKSGGYMTANEWIWDKESWFLKSD  
GKIAEKWVYDSHSQAWYFFKSGGYMTANEWIWDKESWFLKSDGKIAEKWVYDSHSQAWYFFKSGGYMAKNETVD  
45 GYQLGSDGKWLGGKTTNENAAYYQVVPVTANVYSDGEKLSYISQGSVVWLDKDRKSDDKRLAITISGLSGYMKTED  
LQALDASKDFIPYYESDGRHFYHYVAQNASIPVASHLSDMEVGKKYYSADGLHFDGFKLENPFLFKOLTEATNYSAS  
ELDKVFSLLNINNSLLENKGATFKEAEHYHINALYLLAHSALSNWGRSKIADKKNFFGITYAYDTTPYLSAKTFD  
DVDKGI LGATKWI KENYIDRGRTFLGNKASGMNVEYASDPYWGKIASVMMKINEKLGKGDZ

ID205 - 4118.1

50 ATGAAAAAATTAGGTACATTACTCGTTCTCTTTCTTTCTGCAATCATTCTTGTAGCATGTGCTAGCGGAAAAAAGA  
TACAACTTCTGGTCAAAAACATAAAGTTGTGTACAACTCAATCATCGCTGATATTACTAAAAATATTGCTGGTG  
ACAAAATTGACCTTCATAGTATCGTTCGGATTGGGCAAGACCCACACGAATACGAACCACTTCTGAGACGTTAAG  
AAAACCTTCTGAGGCTAATTTGATTTTCTATAACGGTATCAACCTTGAAACAGGTGGCAATGCTTGGTTTACAAAAT  
55 GGTAGAAAATGCCAAGAAAACGAAAACAAAGACTACTTCGAGTCAGCGACGCGTTGATGTTATCTACCTTGAAG  
GTCAAAATGAAAAAGGAAAAGAACCCACACGCTTGGCTTAACCTTGAAAACGGTATTATTTTGTCTAAAAATATC  
GCCAAACAATTGAGCGCCAAAGACCTTAACAATAAAGAAATCTATGAAAAAATCTCAAAGAAATATACTGATAAGTT  
AGACAAACTTGATAAGAAAGTAAGGATAAATTAAGATCCCTGCTGAAAAGAAACTCATTGTAACACGCGAAG  
GAGCATTCAAATCTTCTTAAAGCCTATGGTGCCCAAGTGCTTACATCTGGGAAATCAATCTGAAAGAAGGA  
60 ACTCCTGAACAAATCAAGACCTTGGTTGAAAACCTTCGCCAAACAAAAGTTCCATCACTCTTTGTAGAATCAAGTGT  
GGATGACCGTCCAATGAAAACCTTTCTCAAGACACAAACATCCCAATCTACCGCTCAAATCTTTACTGACTCTATCG

CAGAACAAGGTAAAGAAGGCGACAGCTACTACAGCATGATGAAATACAACCTTGACAAGATTGCTGAAGGATTGGCA  
AAATAA

5 MKKLGTLVLFLSAIILVACASGKKDDTTSQKLVVATNSIIADITKNIAGDKIDLHSIVPIGQDPHEYEPLPEDVK  
KTSEANLIIFYNGINLETGGNAWFTKLVENAKKTENKDYFAVSDGVDVIYLEGQNEKGKEDPHAWNLNLENGIIFAKNI  
AKQLSAKDPNNKEFYENLKEYTDKLDKLDKESKDKFNKI PAEKKLIVTSEGAFFYFSKAYGVPSAYIWEINTEEEG  
TPEQIKTLVEKLRQTKVPSLFEVSSVDDRPMKTVSQDTNIPYIAQIFTDSIAEQGKEGDSYYSMMKRYNLDKIAEGLA  
KZ

10

ID206 - 4119.1

ATGGAATGGTATAAAAAATCGGACTTCTTGCAACTACAGGTTTAGCTTTGTTTGGGCTCGGCGCTTGCTCCAAC  
TGGTAAATCTGCGGATGGCACAGTGACATCGAGTATTTCAACCAGAAAAAGAAATGACCAAAACCTTGGGAAGAAA  
15 TCACCTCGTGATTTTGAGAAGGAAAACCTAAGATCAAGGTCAAAGTCGTCAATGTACCAAAATGCTGGTGAAGTATTG  
AAGACACGCGTTCTCGCAGGAGATGTGCCTGATGTGGTCAATATTTACCCACAGTCCATCGAACTGCAAGAAATGGGC  
AAAAGCAGGTGTTTTGAAGATTTGAGCAACAAAGACTACCTGAAACGCGTGAAAAATGGCTACGCTGAAAAATATG  
CTGTAAACGAAAAAGTTTACAACGTTCTTTTACAGCTAATGCTTATGGAATTTACTACAACAAAGATAAATTCGAA  
GAACTGGGCTTGAAGGTTCTGAAACCTGGGATGAATTTGAACAGTTAGTCAAAGATATCGTTGCTAAAGGACAAAC  
20 ACCATTTGGAATTCAGGTGCAGATGCTGGACACTCAATGGTTACAATCAATTAGCCTTTGCGACAGCAACAGGTG  
GAGGAAAAGAAGCAAAATCAATACCTTCGTTATTTCTCAACCAATGCCATTAAATTTGTCGGATCCGATTATGAAGAT  
GATATCAAGGTCAATGGACATCCTTCGCATCAATGGATCTAAGCAAAAGAACTGGGAAGGTGCTGGCTATACCGATGT  
TATCGGAGCCTTCGCACGTGGGATGTCTCATGACACCAAAATGGGTCTTGGGCGATCACAGCGATTAAATGAACAAA  
AACCGAACCTTAAGATTGGGACCTTCATGATTCAGGAAAAGAAAAAGGACAAAGCTTAACCGTTGGTGGGAGAC  
25 TTGGCATGTTCTATCTCAGCCACCACCAACATCCAAAGAAAGCCAAATGCTTTGTGGAATATATGACCCGTCAGCA  
AGTCATGCAAAAATACTACGATGTGGACGGATCTCCAACAGCGATCGAAGGGGTCAAACAAGCAGGAGAAGATTAC  
CGCTTGGCTGTATGACCGAATATGCTTTACGGATCGTCACTTGGTCTGGTTGCAACAATACTGACCAAGTGAAGCA  
GACTTCCATACCTTGACCATGAACTATGTCTTGACCGGTGATAAACAAGGCATGGTCAATGATTGAATGCTTCTT  
TAACCCGATGAAAGCGGATGTGGATTAG

30

MEWYKKIGLLATTGLALFGLGACSNYKGSADGTVTIEYFNQKEMTKLEEITRDFEKENPKIKVKVNVNPNAGEVL  
KTRVLGADVPDVVNIYQPSIELQEWAKAGVFEDLSNKDYLKRVKNGYAEKYAVNEKVVNVPFTANAYGIYNNKDFE  
ELGLKVPETWDEFELVKDIAVKGQTPFGIAGADAWTLNGYNQLAFATATGGGKEANQYLRYSQPNAILKLSDPIMKD  
DIKVMIDLIRINGSKQKNWEGAGYTDVIGAFARGDVLMTPNGSWAITAINEQKPNFKIGTFMIPGKEKQSLTVGAGD  
35 LAWSISATTTKHPKEANAFVEYMTREVMQKYVDVDSPTAIEGVKQAGEDSPLAGMTEYAFTDRHLVWLQYWTSEA  
DFHTLTMYVLTGDKQGMVNDLNAFFNPMKADVDZ

ID207 - 4123.1

ATGAAGAAAAATCAAACCGCATGGACCGTTACCAAGTCAGACTCAGCTAGCTTATCTGGGAGATGAACTAGCAGCTTT  
40 TATCCACTTCGGTCCTAATACCTTTTATGACCAAGATGGGGGACTGGACAGGAGGATCCTGAGCGCTTTAACC  
GTACAGTTGGATGCGCGTGAGTGGGTTCGTGTCTCAAGGAAACGGGCTTCAAAAAGTTGATTTTGGTGGTCAAGCAC  
CACGATGGCTTTGTCTTTATCCGACAGCTCACACAGATTATTCGGTTAAGGTCACTCCTTGGAGGAGAGGAAAGGG  
CGACTTGCTCCTTGAAGTATCCCAAGCTGCCACAGAGTTTGATATGGATATGGGGGTCTACCTGTCCCGTGGGATG  
45 CCCATAGTCCCCTCTATCATGTGGACCGAGAAGCGGACTACAATGCCTATTATCTGGCTCAGTTGAAGGAAATCTTA  
TCAAATCCTAATATGGGAATGCTGGTAAGTTCGTGAGGTTTGGATGGATGGTCCAGAGGAGAGGGCGGCAAAA  
GGTTAATTATGAATTTGAAAAATGGTTTGAACCAATTCGTGACCTGCAGGGCGATTGCTTGATTTTTCAACAGAAG  
GCACCATATCCGCTGGATTGGCAATGAACGAGGTATGCAGGTGATCCACTGTGGCAAAAGGTGAATCTTGATAAA  
CTAGGAACAGAAGCAGAGCTGAATATCTTCAGCACGGGGATCCCTCGGGCAGGATTTTTCAATCGGAGAGGAGCA  
50 TGTTTCCATCCGTCCAGGCTGTTCTACCATGAGGATCAGGATCCTAAGTCTCTCGAGGAGTTGGTGGAAATCTACT  
TTCACTCAGTAGGGCGAGGAATCCACTCTTGCTTAATATTCGCGCGAATCAAGCTGGGCTCTTGATGCAAAAGGAT  
ATTGAACGACTTTATGAATTTGCGACCTATCGCAATGAGCTCTATAAAGAAGATTGGCTCTGGGAGCTGAGGTATC  
TGGTCCAGCTCTTCCGACAGCTTTGCTTGTGCGCATTTGACAGACGGCCTTGAGACCAGCTCTTGGGCAAGCGATG  
CAGACTTGCCCATCCAGTTAGAACTCGACTTAGGTTCTCCTAAAACCTTTTGATGTAATTGAGTTAAGAGAAGATTG  
AAGCTAGGGCAACGAATCGCTGCTTTTCATGTGCAAGTAGAGGTGGATGGTGTCTGGCAGGAGTTTGGTTCCGGTCA  
55 TACTGTTGGTTACAAACGTCTCTTACGAGGAGCAGTTGTTGAGGCACAGAAGATACGTGTAGTCATTACAGAATCAC  
AGGCTTTGCCTTTGTTGACCAAGATTTCCCTTTATAAAACTCCTGGATTATCAAAAAAGAAAGATTTGTTCCAGGA  
GCATTTGCAGAAAAAGCCTAGCTGTGGCAAGGGAGAAAAATGCCTATTTTACAGTTAAGCGCAGAGAATGTAGTGG  
TCCTTTAGAAGCTAAGATTTGATTCAACCGGGGACAGGTGTCATGGTGTGCGCTATCAGGATGAGATTCAAGTCC  
TTGCGTTTCAAACCTGGTGAGCTGAAAAAGTCTGACGCTACCAACCTTGATTTTCCGAGGAGATAAAACCTTGGAT  
60 TTCTATCTGAACCTAACGGTGGATGGTCAGCTTGTGGATCAACTTCAAGTCCAAGTTTCATAA



5 MKKIKPHGPLPSOTQLAYLGDELAALF IHFGPNTFYDQEWGTCQEDPERFNPSQLDAREWVRVLKETGFKKLILVVKH  
HDGFVLYPTAHTDYSVKVSPWRRGKGDLLLEVSQAATEFDMMDGVYLSPWDHSPLYHVDREADYNAYYLAQLKEIL  
SNPNYGNAGKFAEWMMDGARGEQAQKVNYEFKWFETIRDLOGDCLIFSTEGTSIRWIGNERGYAGDPLWQKVPNDK  
10 LGTEAELNYLQHGDPSGTIFSIGEADVSIRPGWFYHEDQDPKLEELVEIYFHSVGRGTPLLLNIPPNQAGLFDKAD  
IERLYEPATYRNELYKEDLALGAEVSGPALSADFACRHLTDGLETSSWASDADLP IQLELDLGSFKTFDVI ELREDL  
KLGQRIAAAFHVQVEVDGVWQEFSGHTVGYKRLLRGAVVEAQKIRVVI TESQALPLLTKISLYKTPGLSKKEVVOEL  
AFAEKSLAVAKGENAYFTVKRRECSGPLEAKISIQPGTVGHVAYQDEIQVLAFTGETEKS LTLPTLYFAGDKTLD  
FYLNLTVDGQLVDQLQVQVSZ

15 ID208 - 4125.12

ATGCTTGAAAGACTGAAAAGAATACATTATATGTTTTGGATCAGTTTAAATTTTATGATTTTCCCCATCCTGTCTGT  
AGTGACTGGGTGGCTTTCTGCCTGGCATTATTGATTGATATTCTATTTGTAGTGGCATATTTGGGTGTTTTAACAA  
15 CTAAGAGCCAGCGCCTATCTTGGCTATATTGGGGCCTCATGCTGACTTATGTAGTTGGGAATACCTGCCTTTGTGTCT  
GTTAATTATATCTGGTTTTCTTTTCTATCCAATCTCTTAAGTTATCATTTCAGCGTACGTAGTTTAAAGTCTTT  
ACATGTCTGGACTTTTCTTCTTGCTCAAGTCCTTGTGTGGGGCAACTGTTGATTTTTCAGAGAATCGAAGTTGAGT  
TTCTATTCTATCTACTTGAATTCTTACTTTTGTGCGATTTAATGACTTTTGGATTGGTTCGGATTCTGATTGCGAG  
GATTTGAAAGAAGCTCAGGTCAAGCAAAATGCTCAGATAAATCTATTGCTTGTGAAAATGAACGTAGTCGTATCGG  
20 TCAGGATTTGCATGATAGTCTGGGACATACCTTTGCTATGCTGAGTGTCAAGACAGATTTAGCCTTGCAGTTATTT  
AGATGGAGGCTTATCCACAGGTGAAAAGGAATTAAGAAATTCACCAGATCAGCAAGGATCCATGA

25 MLERLKRHYMFWISLIFMIFPILSVVTGWLSAWHLLIDILFVVAYLGVLTTKSQRLSWLYWGLMLTYVVGNTAFVA  
VNYIWFFFFLSNLSYHFSVRSLSLHVWTFLLAQVLVVGQLLI FORIEVEFLFYLLVILTFVDLMTFGLVRIRIVE  
DLKEAQVKQNAQINLLLAENERSRIGQDLHDSLGHFAMLSVKTDLALQLFQMEAYPQVEKELKEIHQISKDPZ

30 ID209 - 4126.3

ATGAATGATAAGTTAAAAATCTTCTTGTGCTAGGAGTATTTTTCTAGCCATAACCGGTTTCTATGTTCTATTGAT  
ACGAAATGCAGGGCAGACAGATGCCTCGCAAATTGAAAAGCGCGCAGTTAGCCAAGGAGGAAAAGCAGTGAAAAAAA  
30 CAGAAATTAGTAAAGACGACAGACTTGCACGAAATTTATCTAGCTGGAGGTTGTTTCTGGGGAGTGGAGGAATATTT  
TCACGTGTTCCCGGGGTGACGGATGCCGTTTCAGGCTATGCAAATGGTAGAGGAGAAACAACCAAGTACGAATTGAT  
TAACCAACAGGTGATGCAGAAACCGTCCATGTACCTATGATGCCAAGCAAATTTCTCTCAAGGAAATCCTGCTTC  
ACTATTTCCGCATTATCAATCCAACCGCAAAAATAACAAGGAAATGATGTGGGACCCAGTACCGTACTGGTGTT  
35 TATTACACAGTGACAAGGATTTGGAAGTGATTAACCAAGTCTTTGATGAGGTGGCTAAGAAATACGATCAACCTCT  
AGCAGTTGAAAAGGAAAACCTGAAGAATTTGTGGTGGCTGAGGATTACCATCAAGACTATCTCAAGAAAAATCCAA  
ATGGCTACTGCCATATCAATGTTAATCAGGCGGCTATCCTGTCTATTGATGCCAGCAAAATATCCAAAACCAAGTAT  
GAGGAATTGAAAAGACCCCTGTCACTGAGGAGTATGCAGTTACCCAGGAAAATCAACAGAACGAGCTTTCTCAAA  
40 CCGTTACTGGGATAAATTTGAATCCGGTATCTATGTGGATATAGCAACTGGGGAAACCTCTCTTTTATCAAAAAGACA  
AATTTGAGTCTGGTTGTGGCTGGCTAGTTTTACCCAACCCATCAGTCCAGATGTTGTCACTACAAGGAAGATAAG  
TCCTACAATATGACCGTATGGAAGTGGGAGCCGAGTAGGAGATTCTCACCTTGGGCATGTCTTACGGATGGTCC  
ACAGGACAAGGGCGGCTTACGTTACTGTATCAATAGCCTCTCTATCCGCTTTATCCCAAAGACCAATGGAAGAAA  
AAGGCTACGCTTATTTACTAGATTATGTTGATTAA

45 MNDKLIKIFLLGVFFLAITGFYVLLIRNAGQTDASQIEKAAVSQGGKAVKTEISKDADLHEIYLAGGCFWGVVEEYF  
SRVPGVTDVSGYANGRGETTKYELINQTHAETVHVTYDAKQISLKEILLHYFRI INPTSKNKQGNVDVGTQYRTGV  
YYTDDKDLVINQVFDEVAKKYDQPLAVEKENLKNFVVAEDYHQDYLKQNPNGYCHINVNQAAYPVIDASKYKPSD  
EELKKTLSPEEYAVTQENQTERAFSNRYWDFESGIYVDIATGEPLFSSKDKFESGCGWPSFTQPI SPDVVVTYKEDK  
50 SYNMRMEVRSRVGDSHLGHVFTDGPQDKGLRYCINSLSIRFIPKQDMEKGYAYLLDYVDZ

55 ID210 - 4127.1

ATGAAAAGAAATGGATGTATTATGCTGCTTGTCTTCTAATGAATCTGCCGATGACAGTTCATCTGATAAAGGAGA  
CGGCGGTTTCGCTAGTCGTTTATTACCAAATCAGAGGGCTTAATTGGAGCAACTATTCCTGCCTTTGAAGAAAAAT  
60 ATGGTATCAAAGTAGAACTGATTCAAGCTGGTACTGGAGAACTTTCAAAAACTAGAGTCAGAAAAAGAAGTTCTCT  
GTAGCTGATGTTATCTTTGGTGGTTCTTATACACAATATACTACCCACGGAGAACTCTTTGAAAATCTACTTCAAA  
AGAAAAATGATAATGTTATCAAAGAATATCAAACACAACCTGGCTACTTACTCTTATACACTAGATGGTAGTGT  
TAATCGTCAACCCGATTTAACTAAAGGCATGAACATCGAAGGATATAACGATCTTTTCAAACCTGAACCTAAAGGA  
AAAAATCGCAACTGCTGACCAGCAAACTCTTCTAGCGCTTTGCTCAATTAACAAATATGCTACAAGCTCAAGGTGG  
TTACAAAGATGATAAGGCTTGGTCTTATGTAAAGATCTTTTACACTATTGATGGTAAATCGGTTCAAGTTCTAT  
CTAGTGTCTATAAAGTAGTCGCTGATGGAGAAATGGCTGTTGGTCTCTCTTATGAAGATCCAGCAGTTAAACTCTTA

5 AATGACGGAGCTAACATTAAGGTAGTCTATCCAAAAGAAGGAACCGTCTTCTACCTGCTAGTGCTGCTATCGTTAA  
 AAAATCTAAAAATATGGAAGTGAAGAAATTTATCGATTTTATTATCTCTCAAGAAGTACAAGATACACTTGGTA  
 CAACCACTACTAACCGTCTGTTTCGTAATAAATGCTAAAAAAGCGGAAACATGAAACCAATTGACAAAATCAAAACA  
 CTCACTGAAGATTATGATTATGTCATCAAGAATAAATCAGATATCGTTAAGAAATACAACGAAGTCTTTACAGATAT  
 CCAATCTAAACAGTAA

10 MKKKWMYAACSSNESADSSSDKGDGSLVVYSPNSEGLIGATIPAFEEKYGIKVELIQAGTGELFKLESEKEVP  
 VADVIFGGSYQYTTGELFENYTSKENDNVIKEYQNTTGYSTPYTLDGSLVINPDLTKGMNIEGYNDLFKPELKG  
 KIATADPANSSSAFAQLTNMLQAQGGYKDDKAWSYKDLFTLIDGKIGSSSSSVYKVVADGEMAVGLSYEDPAVKLL  
 NDGANIKVVYPKEGTVFLPASAAIVKSKNMENAKKFDIFIISQEVQDTLGTITTTNRPVRRNAKTSENMPIDIKIT  
 LTEDYDVVIKNSDIVKKYNEVFTDIQSKQZ

15 ID211 - 4127.2  
 ATGAGTGAGATCAAAATTATTAACGCCAAAAAATCTACCAGCATGTCCCTGTTATTGAGAATTTGAACATTACAAT  
 TCCAAAAGGAAGTCTCTTTACCTTCTTGGAGCTTCAGGATGTGGGAAAACGACCCTTCTTCGTATGATTGCAGGTT  
 TCAACAGTATCGAAGGTGGAGAATTTTACTTCGATGATACAAAAATCAATAATATGGAACCCAGCAACCCAATATC  
 GGGATGGTTTTCCAAAACACTACGCTATTTCCACATTTGACTGTCCGAGACAACGTTGCTTTTGGTCTTATGCAAAA  
 GAAGGTTCCAAAAGAAGATTGATTCAACAGACCAACAAGTATCTTGAACCTCATGCAAAATGCTCAATATGCGGATC  
 20 GAAAGCCCGATAAACTCAGTGGTGGACAACAACAGTGTACCTTGGCATGCGCCTTAGCGGTTAATCCAAGTGT  
 CTCCTCATGGACGAGCCACTTAGTAATCTGGAGGCCAACTTCGCTTGGATATGCGTCAAGCCATCCGAGAAATCCA  
 ACACGAAGTGGGAATTACAACCTGTTTATGTAACCCACGACCAAGAAGAAGCCATGGCTATTTCAGACCAAAATGGTG  
 TTATGAAAGATGGGGTGATCCAACAAATCGGCCGACCAAAAGAACTCTATCATAAACCAGCTAATGAGTTTGTGGCA  
 ACCTTTATCGGACGCACAAATATTATCCCTGCCAATCTTGAAAAACGGAGCGACGGCGCTTATATCGTCTTTTCAGA  
 25 TGGCTATGCCCTTCGAATGCCAGCTCTTGATCAGGTTGAGGAGCAAGCTATTCTGTAAGCATTCTGCCGAAGAGT  
 TTATCAAAGATGAATCTGGAGATATTGAAGGAACATTAGAGATAGCGTCTATCTTGGACTAAATACGGATTATTTTC  
 ATTGAGACAGGTTTTGCCTCAAAAATTCAAGTTAGTGAAGAATCAACTTTTGAAGAAGATCTACAAAAAGGCAATCG  
 TATTCGTCTACGAATCAATACGCAAAAATTAACATCTTTTCTGCAGATGGTTCCCAAAACCTGATAAAAGGAGTCA  
 ACCATGGAACGTAA

30 MSEIKIINAKKIYHDPVNIENLITIPKGSFLTLLQASGCGKTTLLRMIAGFNSIEGGEFYDDTKINMPEPSKRNI  
 GMVFQNYAIFPHLTVRDNVAFGLMQKKVPKEELIQQTNKYLELMQIAQYADRPDKLGGQQQVRVTLACALAVNPSV  
 LLMDEPLSNLEAKRLDMRQAIREIQHEVGITTVYVTHDQSEAMAI SDQIAVMKDGVIQQIGRPKELYHKPANEFVA  
 35 TFIGRTNIIIPANLEKRS DGAYIVFSDGYALRMPALDQVEEQAIHVSIRPEEFIKDES GDIEGTIRDSVYLG LNTDYP  
 IETGFASKIQVSEESTFEEDLQKGNRIRLRINTQKLNIF SADGSONLIKGVNHGTZ

ID212 - 4136.1  
 ATGAAGAAAAAATTATTGGCAGGTGCCATCACACTATTATCAGTAGCAACTTTAGCAGCTTGTTGAAAGGGTCAGA  
 40 AGGTGCAGACCTTATCAGCATGAAAGGGGATGTGATTACAGAACATCAATTTTATGAGCAAGTGAAAGCAACCTT  
 CAGCCCAACAAGTCTTGTTAAATATGACCATCCAAAAGTTTTTGAAAAACAATATGGCTCAGAGCTTGATGATAAA  
 GAGGTTGATGATACTATTGCCGAAGAAAAAACAATATGGCGAAAACCTACCAACGTGTCTTGTCACAAGCAGGTAT  
 GACTCTTGAAACACGTAAAGCTCAAATTCGTACAAGTAAATTAGTTGAGTTGGCAGTTAAGAAGGTAGCAGAAGCTG  
 AATTGACAGATGAAGCCTATAAGAAAGCCTTTGATGAGTACACTCCAGATGTAACGGCTCAAATCATCCGTCTTAAT  
 AATGAAGATAAGGCCAAAGAAGTTCTCGAAAAAGCCAAAGGCAGAAGGTGCTGATTTTGCTCAATTAGCCAAAGATAA  
 45 TTCAACTGATGAAAAACAAAAGAAAATGGTGGAGAAATTACCTTTGATTCTGCTTCAACAGAAGTACCTGAGCAAG  
 TCAAAAAAGCCGCTTTGCTTTAGATGTGGATGGTGTCTGATGTGATTACAGCAACTGGCACAAGCCTACAGT  
 AGCCCAATTACATTGTAAGTCACTAAGAAAAACAGAAAAATCATCTAATATTGATGACTACAAAGAAAAATTA  
 AACTGTTATCTTGACTCAAAAAACAAAATGATTCAACATTTGTTCAAAGCATTATCGGAAAAGAAATTGCAAGCAGCCA  
 ATATCAAGGTTAAGGACCAAGCCTTCAAAAATATCTTTACCCAATATATCGGTGGTGGAGATTCAAGCTCAAGCAGT  
 50 AGTACATCAAACGAATAG

55 MKKKLLAGAITLLSVATLAACSKGSEGADLISMKGDVITEHQFYEQVKSNPASQOVLLNMTIQKVFQYGSLEDDK  
 EVDDTIAEEKQYGENYQVLSQAGMTLETRKAQIRTSKLVELAVKKVAEELTDEAYKAFDEYTPDVTAQIIRLN  
 NEDKAKEVLEKAKAEGADFAQLAKDNSTDEKTKENGGEITFDSASTEVPEQVKKAFAFDVGVSDVITATGTQAYS  
 SQYYIVKLTKKTEKSSNIDDYKEKLKTVILTQKQNDSTFVQSIIGKELQAAAIKVKDQAFQNI FTQYIGGGDSSSS  
 STSNEZ

60

ID213 - 4137.3

5 ATGAAAAAAAAATATTAAACAATATGTAACCTTAGGTACTGTAGTGGTATTATCAGCATTGTGTGCTAACTCAGTTGC  
 AGCTCAGGAGACTGAAACTTCTGAAGTATCAACACCAAAGTTGGTGCAACCTGTTGCACCAACGACTCCGATTTCGG  
 AAGTACAACCTACATCGGATAACTCTTCGGAAGTTACTGTACAACCTCGAACAGTTGAAACTACTGTTAAGGATCCA  
 TCTTCTACAGCGGAAGAACTCCTGTCTTAGAAAAAATAATGTTACTTTAACAGGGGGCGGAGAAAAATGTTACTAA  
 AGAGTTAAAGGATAAAATTTACTAGCGGTGACTTTACTGTAGTGATTAAGTACAATCAGTCAAGTGAGAAAGGCTTAC  
 AAGCTCTGTTTGGAAATATCTAATTCCAAACCCGGTCAACAAAAATAGTTATGTAGATGTGTTCTTAGAGACAAATGGT  
 10 GAGTTGGGGATGGAAGCGCGTGATACTTCTCCAATAAAAAATAACCTAGTATCCAGACCTGCTTCAGTTTGGGGTAA  
 GTACAAACAAGAGGCTGTGACTAACACTGTTGCGAGTAGTAGCAGATTTCAGTCAAAAAACATATTCTTTATACGCAA  
 ATGGTACAAAAGTAGTAGAAAAGAAAGTGGATAATTTCTAAACATCAAGGATATTAAGGTATTGATTACTATATG  
 CTTGGGGAGTGAAACGTGCAGGAAAAACGGCTTTGGTTTAAACGGAACTAGAAAAATATCAAATCTTTAATAG  
 TGCATTGGATGAAGAACTGTTAAAAAGATGACAACAAACGCTGTTACTCGACATTTAATTTATACGGCTAATGATA  
 15 CAACAGGTTCTTAACATTTCCGTATTCCAGTTCTGTATACTTTAGCAATGGTCGGGTATTTCAAGCATTTGACGCT  
 CGTTACGGTGGAACTCATGATTTCTTGAATAAAATTAATATTGCTACAAGTTATAGTGATGATAATGGTAAGACATG  
 GACTAAACCAAAATTAACATTGGCATTTCGATGATTTTGGCCAGTACCATTAGAATGGCTCGTGAAGTTGGTGGAC  
 GTGACTTACAAATCAGCGGTGGTGCACCTATATTGACTCTGTTATTGTTGAAAAAAGAACAAACAGTACTCATG  
 TTTGCTGATGTGATGCTGCTGGAGTAAGTTTAGAGAAGCAACTAGAAAAGATTGAGTTATAACAAATTTGATGG  
 TAATTATTACCTTAAATTAAGGAAACAAGGTGATCTGATTACAATTATACTATTTCGTGAGAATGGTACTGATACG  
 20 ACGATCGTACCAACAGACCAACTGAATTTTCAGTAGATAAAAAATTCGGTATTAAACAAATGGTAATTTTGGACG  
 GTAGAGCGG

25 MKKNIKQYVTLGTVVLSAFVANSVAAQETETSEVST?KLVPVAPPTPISEVQPTSDNSSEVTVPRTVETTVKDP  
 SSTAETPVLEKNNVLTGGGENVTKELKDKFTSGDFTVVIKYNQSSSEKGLQALFGISNSKPGQONSVDVFLRDNG  
 ELGMEARDTSSNNKLVSRPASVWGKYKQEAVENTVAVVADSVKTYSLYANGTKVVEKKVONFLNIXDIXGIDYYM  
 LGGVKRAGKTAFFNGTLENIKFNSALDEETVKMNTNAVTGHLIYTANDTTGSNYFRI PVLYTFSNGRVFSSIDA  
 RYGGTHDFLNKINIATSYSDONGKWTWKPLTLAFDDFAPVPLEWPREVGGRLQISGGATYIDSVIVEKKNKQVLM  
 FADVMPAGVSFREARKDSGYKQIDGNYYLKLKQGD TDNYTIRENGTVYDDRTNRPTEFSVDKNFGIKQNGNYLT  
 VER

ID214 - 4185

30 ATGAAAAAATTTAGCCTATTACTAGCTATCCTACCATTTTTGGTTGCCTGTGAGAATCAAGCTACACCCAAAGAGAC  
 TAGCGCTCAAAGACAATCGTCTTGTCTACAGCTGGCGACGTGCCACCTTTGACTACGAAGACAAGGCAATCTGA  
 CAGGCTTTGATATCGAAGTTTAAAGGCAGTAGATGAAAAACTCAGCGACTACGAGATTCAATTCCAAAGAACCGCC  
 35 TGGGAGAGCATCTTCCAGGACTTGATTCTGGTCACTATCAGGCTGCGGCCAATAACTTGAGTTACACAAAAGAGCG  
 TGCTGAAAAATACCTTTACTCGCTTCCAAATTTCCAACATCCCTCGTCTTGTGAGCAACAAAGAAAAATCCTTTGA  
 CTTCTCTTGACCAGATCGCTGGTAAACAAACAAAGAGGATACCGGAACCTTCTAACGCTCAATTCATCAATAACTGG  
 AATCAGAAACACACTGATAATCCCCTACAATTAATTTCTGCTGAGGATATTGGTAAACGAATCCTAGACCTTGC  
 TAACGGAGAGTTTGATTTCTAGTTTTTGACAAGGTATCCGTTCAAAGATTATCAAGGACCGTGGTTAGACCTCT  
 40 CAGTCGTTGATTTACCTTCTGCAGATAGCCCCAGCAATATATCATTTTCTCAAGCGACCAAAAGAGTTTAAAGAG  
 CAATTTGATAAAGCGCTCAAAGAACTCTATCAAGACGGAACCTTGAAAAACTCAGCAATACCTATCTAGGTGGTTC  
 TTACCTCCAGATCAATCTCAGTTACAATAA

45 MKKFSLLLAILPFLVACENQATPKETSAQKTVLATALAGDVPFPDYEDKGNLTGFDIEVLKAVDEKLSDYEQFQRTA  
 WESIFPGLDSGHYQAAANNLSYTKERAELYSLPISNNPLVLVSNKKNPLTSLDQIAGKTTQEDTGTSSNAQFINNW  
 NQKHTDNPATINFSGEDIGKRI LD LANGEFFLVFDKVSQKIKDRGLDLSVVDLP SADS PSNYIIFSSDQKEFFE  
 QFDKALKELYQDGTLEKLSNTYLGGSYLPDQSQLQZ

ID215 - 4211.1

50 ATGAAAAAATAGTTTATATATCATATCCTCACTCTTTTGGTGTGTCTATTGTCTATGCTACGGCGACGAA  
 TTTTCAAACAGTACCAGTGCTAGGCAGGTA AAAACCGAAACCTATACTAATACAGTAACAAATGTCCTATTGACA  
 TACGCTATAATAGTGATAAGTATTTATTAGCGGTTTTCCTTCAGAAGTATCAGTGGTCTTGACTGGTGCAATCGC  
 CTATCGCTAGCTAGTGAAATGCAAGAAAGTACACGTAAATCAAGGTTACTGCTGACCTAACAGATGCGCGTGTGG  
 55 AACGATTGAAGTTCTTTGAGCATTGAAGATTTACCCAATGGGCTGACCGCTGTGGCGACTCCGCAAAAAATTACAG  
 TCAAGATTGGTAAGAAGGCTCAGAAGGATAAGGTAAAGATTGTACCAGAGATTGACCTTAGTCAAATTTGATAGTCGG  
 GTACAAATTGAAAAATGTCAATGGTGTGAGATAAAGAAGTGTCTATTACGAGTGACCAAGAGACATTGGATAGAAATGA  
 TAAGATTATCGCTGTTTTGCCAACTAGCGAAGCTATAACAGGTAATTACAGTGGTTGAGTACCTTTGAGGCAATCG  
 ACCGCAATGGTGTGTCTTACCGGCAGTTATCACTCCGTTTGATACAATAATGAAGGTGACTACAAAACAGTAGCA  
 60 CCAAGTTCAAGCATCAAATTCAGTACAAGCAGTTTCATCGGAGACATCTTCGTCAACGAAAGCAACTAGTTCAA  
 AACGAATTAA

5 MKKNSLYIISSLFACVLFVYATATNFQNSTSARQVKTEYTNVTNPIDIRYNSDKYFISGFASEVSVVLTGANR  
LSLASEMQESTRKFKVTADLTDAGVGTIEVPLSIEDLPNGLTAVATPQKITVKIGKKAQKDKVRIVPEIDPSQIDSR  
VQIENVMVSDKEVSITSDQETLDRIDKIIAVLPTSERITGNYSGSVPLQAIDRNGVVLPVITPFDTIMKVTTKPVA  
PSSSTSNSSTSSSSETSSSTKATSSKTNZ

ID216 - 4127.3

10 ATGTTGATTGGCGAAGGGTATCGGACTTTCCTGTCTGATTTATACCCAATTTATTAGCGAGGTTGGAGGAAATTC  
TGCTTTTGCAATTATGGCGATTATCATTGCCTTGGCAATTTTCCTTATCCAAAAACACATTGCAAACCGCTACAGTT  
TCAGCATGAATCTGCTCCATCCAATTGAGCCTAAAAAACTACAAAAGGAAAAATGGCTGCCATTTATGCAACAGTC  
TACGGAATTATCTTATCTCTGTTTTACCTCAAATCTACTTAATTTATACCTCTTTCCTAAAAACATCAGGTATGGT  
ATCTGTTAAAGGTTATTCTCAAACAGTTACAAGGTAGCTTCCATCGTATGGGATCTGCTATTTTCAATACCATTC  
15 GTATCCCTTTGATTGCCTTAGTTCTAGTTGTTCTATTTCGACATTTATCTCCTACCTAGCCGTTAGAAAAACGGAAT  
TTGTTTACAACTTAATTGACAGCCTCAGTATGGTACCTTATATTGTACCAGGAACCGTTCTAGGGATTGCCTTCAT  
TTCTTCCTTCAATACTGGTCTATTGGAAGTGGATTCTTATGATTACAGGGACTGCTTTCATCTTGATTATGTCTC  
TATCTGCCAGAAGATTACCTTATACTATTGCTCATCTGTTGCTAGCTTACAACAAATAGCACCAAGTATTGAAGAA  
GCTGCTGAAAGCTTAGGAAGTAGTCGTCTCAATACCTTTGCTAAGATTACAACCTCCAATGATGCTATCTGGTATCAT  
20 TTCTGGAGCCATCTTATCTTGA

25 MLIGEGYRTFPVLIYTQFISEVGGNSAFAIMAIIIALAIFLIQKHIANRYSFSMNLLHPIEPKTTKGMAAIYATV  
YGIIFISVLPOIYLIYTSFLKTSGMVSVKGYSYKVAFHRMGSATFNTIRIPLIALVLVLFATFISYLAVRKRN  
LFTNLIDSLSMVPYIVPGTVLGIAFISSFNTGLFGSGFLMITGTAFILIMSLSARRLPYTIRSSVASLQQIAPSIEE  
AAESLGSSRLNTFAKITTPMMLSGIISGAILSZ

5  
TACTTTTGTGAAGAGCAGAAGATCTCCACAAGTTGTCCGAAAAATCTTCATTAGAGCAAGAAATATGAGGAAGCAAAAG  
CAAAAGCTGATACTGCCAAGAAAGATTACGAAACGGCTAAAAAGAAAGCAGAAGACCTCAGAAAAGATGAAAGAT  
GATCAGAAGAGAACTGAGGAGAAAGCTCGAAAAGAAGCAGAAGCATCTCAAAAATTGAATGATGTGGCGCTTGTGT  
TCAAAATGCATAAAGAGTACCGAGAAGTTCAAAATCAACGTAGTAAATATAAATCTGACGCTGAATATCAGAAAA  
AATTAACAGAGGTGCAGTCTAAAAATAGAGAAGGCTAGGAAAGAGCAACAGGACTTGCAAAATAAATTTAATGAAGT  
10 AGAGCTGTGTAGTTCTCTGAAGCAAAATGCGTTGGCTGAGACTAAGAAAAGCAGAAGAAGCTAAAGCAGAGAAAA  
AGTAGCTAAGAGAAAAATATGATTATGCAACTCTAAGGTAGCACTAGCGAAGAAAGAGTAGAGGCTAAGGAACTTG  
AAATTGAAAAACTTCAATATGAAATTTCTACTTTGGAACAAGAAGTTGCTACTGCTCAACATCAAGTAGATAATTTG  
AAAAAATCTTCTGCTGGTGGCGATCCTGATGATGGCACAAGAAGTTATAGAAGCTAAAATAAAAAAGGAGAGAAGCTGA  
15 GCTAACGCTAAACAAGCTAGTTAGTACAAAAAACAACAGAACTTGAAAACTTCTTGACAGCTTGATCTGAAG  
GTAAGACTCAGGATGAATTAGATAAAGAAGCAGAAGAAGCTGAGTTGGATAAAAAAGCTGATGAATCTCAAAATAAA  
GTTGCTGATTTAGAAAAAGAAATTAGTAACCTTGAATATTACTTTGGAGGGGCTGATCCTGAAGATGATACTGCTGC  
TCTTCAAAATAAATTAGCTGCTAAAAAAGCTGAGTTAGCAAAAAACAACAGAACTTGAAAACTTCTTGACAGCC  
20 TTGATCCTGAAGGTAAGACTCAGGATGAATTAGATAAAGAAGCAGAAGAAGCTGAGTTGGATAAAAAAGCTGATGAA  
CTTCAAAATAAAGTTGCTGATTTAGAAAAAGAAATTAGTAACCTTGAAATATTACTTTGGAGGGGCTGATTCTGAAGA  
TGATACTGCTGCTCTTCAAAATAAATTAGCTACTAAAAAAGCTGAATTGGAAAAAACTCAAAAAGAAATTAGATGCGAG  
CTCTTAATGAGTTAGGCCCTGATGGAGATGAAGAAGAAACTCCAGCGCGGCTCCTCAACCAGAGCAACCAGCTCCT  
25 GCACCAAAACAGAGCAACACAGCTCAGCTCCAAAACAGAGCAACAGCTCCTGCAACCAAAACAGAGCAACAGC  
TCCAGCTCCAAAACAGAGCAACACAGCTCCAGCTCCAAAACAGAGCAACAGCTAAGCCGAGAGAAACAGCTGAAG  
AGCCTACTCAACCAAGAAAAACAGCCTCCAAAACAGGCTGGAACAAGAAACGGTATGTGGTATTCTACAAT  
ACTGATGGTTCAATGGCAATAGGTTGGCTCCAAAACAGCTCATGGTACTACTCAAAACGCTAACCGGCTATGGC  
AACAGTTGGGTGAAAGATGGAGATACCTGGTACTATCTGAAGCATCAGGTGCTATGAAAGCAAGCCAAATGGTTCA  
AAGTATCAGATAAATGGTACTATGTCAACAGCAATGGCGCTATGGCGACAGGCTGGCTCCAATACAATGGCTCATGG  
30 TACTACCTCAACGCTAATGGTGATATGGCGACAGGATGGCTCCAATCAACCGGTTTCATGGTATTACCTCAACGCTAA  
TGGTGATATGGCGACAGGATGGCTAAAGTCAACGGTTTCATGGTACTACTCAAAACGCTAACCGGTGCTATGGCTACAG  
GTTGGGCTAAAGTCAACGGTTTCATGGTACTACTCAACGCTAACGGTTCAATGGCAACAGGTTGGGTGAAAGATGGA  
GATACCTGGTACTATCTGAAGCATCAGGTGCTATGAAAGCAAGCCAAATGGTTCAAGTATCAGATAAATGGTACTA  
TGTCATGCTTTAGGTGCCCTTGCACTCAACCAACTGTAGATGGCTATAAAGTCAATGGCAATGGTGAATGGGTTT  
AA

35 MNKKMILTSLASVAILGAGFVTSQPTFVRAESPOVVEKSLEKKYEEAKAKADTAOKDYETAUKKAEDAQKPYED  
DQKRTEEKARKEAESQKLNDAVALVQONAYKEYREVQNQRSKYKSDAEYQKKLTEVDSKIEKARKEQQDLQNKFN  
RAVVVPEPNALAEETKKAEEAKAEKVAKRKYDYATLKVALAKKEVEAKELEIEKLQYBISTLEQEVATAQHQVDNL  
KLLLAGADPDGTEVTI EAKLKGGEALNAKQAE LAKKQTELEKLLDSDLDPGKTPQDELDKEAEAEALDKKADELQNK  
40 VADLEKEISNLEILLGGADPEDDTAALQNLAKKAE LAKKQTELEKLLDSDLDPGKTPQDELDKEAEAEALDKKADE  
LQNKVADLEKEISNLEILLGGADSEDDTAALQNLKATKKALEKTEKLELDLAAALNGLPGDDEETPAPAPQPEQPAP  
APKPEQPAPAPKPEQPAPAPKPEQPAPAPKPEQPAPAPKPEQPAKPEKFAEETPQPEKPATPKTGWKQENGMWYFYN  
TDGSMAGIWLQNNGSWYYLNLANGMATGWVKDGDWTWYYLEASGAMKASQWFKVSDKWYVYNSNGAMATGWLQYNGSW  
YYLNLANGDMATGWLQYNGSWYYLNLANGDMATGWAKVNGSWYYLNLANGMATGWAKVNGSWYYLNLANGSMATGWVKDG  
DTWYYLEASGAMKASQWFKVSDKWYVYVNLGALAVNTVDGYKVNANGEMWVZ

ATGTTTGCATCAAAAAGCGAAAGAAAAGTACATTATTCAATTTCGTAATTTAGTGTGGAGTAGCTAGTGTAGTTGT  
TGCCAGTCTTGTTATGGGAAGTGTGGTTTCAATGCGACAGAGAACGAGGGAGCTACCCAAGTACCACTTCTTCTAATA  
50 GGCCAATGAAAGTCAGGCAGAACAGGAGGAACAACCTAAAAAATCTCGATTAGCAAGCAGATTAAGGCCAAGGAAGAG  
TTCGAGGAATATGTAAAAAATAGTGGGTGAGAGCTATGCAAAATCAACTAAAAAGGCACATCAAACTACTGTAGC  
TCTAGTTAACGAGTTGAACAACATTAAAGACGAGTATTTGAATAAAATAGTTGAATCAACCTCAGAAAGCCAACTAC  
AGATACTGATGATGGAGAGTCGATCAAAAGTAGATGAAGCTGTGTCTAAGTTTGAAAAGGACATCTCTTCGTGTA  
AGTTCAAGCTCTTCCATAAACCGGAAGCTTCAGATACAGCGAAGCCAAACCAAGCCGACAGAACCGGAGAAAAGGT  
AGCAGAAGCTAAGAAGAAGGTTGAAGAAGCTGAGAAAAAGCCAAAGGTCAAAAAGAAGAAAGTCTGTCGTAACCTACC  
55 CAACCTATTACTTACAAAACGCTTGAACCTGAAATTTGCTGAGTCCGATGTGGAAGTTAAAAAAGCGGAGCTTGAACTA  
GTAAAAGTGAAGAGCTAACGAACTTCAGAGCGAGCAAAAAATTAAGCAAGCAGAAGCGGAAGTTGAGAGTTAAACAAGT  
TGAGGCTACAAGGTTAAAAAATAACAAGCAGATCGTGAAGAAGCAGAAGAAGAGCTTAAACGAAGACGAGATGCTTA  
AAGAGCAAGGTAAACCAAAGGGCGGGCAAAACGAGGAGTTCTCTGGAGAGCTAGCAACACCTGATAAAAAAGGAAAT  
60 GATGCGAAGTCTCAGATTCTAGCGTAGGTTGAAGAAATCTTCCAAGCCACTCTCTGAAACCGAAAAAAGGTAGC  
AGAAGCTGAGAAGAAGGTTGAAGAAGCTAAGAAAAAGCCGAGGATCAAAAAGAAGAAGATCCGCTTAACCTACCCAA

CCAATACTTACAAAACGCTTGAACTTGAAATTGCTGAGTCCGATGTGGAAGTTAAAAAGCGGAGCTTGAAGTCTAGTA  
AAAGAGGAAGCTAAGGAACCTCGAAACGAGGAAAAAGTTAAGCAAGCAAAAGCGGAAGTTGAGAGTAAAAAGCTGA  
GGGTACAGGTTAGAAAAATCAAGACAGATCGTAAAAAGCAGAAGAAGCTAAACGAAAAGCAGCAGAAGAAG  
ATAAAGTTAAAGAAAAACCAGCTGAACAACCAACAGCGCCGGCTCCAAAAGCAGAAAAACCAGCTCCAGCTCCA  
5 AAACCAGAGAATCCAGCTGAACAACCAAAAGCAGAAAAACCAGCTGATCAACAAGCTGAAGAAGACTATGCTCGTAG  
ATCAGAAGAAGAATATAATCGCTTGACTCAACAGCAACCGCCAAAAACTGAAAAACCAGCACAACCATCTACTCCAA  
AAACAGGCTGGAAACAAGAAAACGGTATGTGGTACTTCTACAATACTGATGGTTCAATGGCGACAGGATGGCTCCAA  
AACAATGGCTCATGGTACTACCTCAACAGCAATGGCGCTATGGCGACAGGATGGCTCCAAAACAATGGTTATGGTA  
10 CTATCTAAACGCTAATGGTTCAATGGCAACAGGATGGCTCCAAAACAATGGTTATGGTACTACCTAAACGCTAATG  
GTTCAATGGCGACAGGATGGCTCCAAATCAATGGCTCATGGTACTACCTAAACGCTAATGGTTCAATGGCGACAGGA  
TGGCTCCAAATCAATGGCTCATGGTACTACCTAAACGCTAATGGTGATATGGCGACAGGTTGGGTGAAAGATGGAGA  
TACCTGGTACTATCTTGAAGCATCAGGTGCTATGAAAGCAAGCCAATGGTTCAAAGTATCAGATAAATGGTACTATG  
TCAATGGCTCAGGTGCCCTTGAGTCAACACAACCTGTAGATGGCTATGGAGTCAATGCCAATGGTGAATGGGTAAC  
TAA

15 MFASKSERKVHYSIRKFSVGVASVVVASLVMGSVVHATENEGATQVPTSSNRANESQAEQGEQPKLDSERDKARKE  
VEEYVKIIVGESYAKSTKKRHTITVALVNLNINIKNEYLNKIVESTSESQLOILMMESRSKVDEAVSKFEKSSSSS  
SSDSSTKPEASDTAKPNKPTPEGEKVAEAKKKVEAEKKAQDQKEEDRRNYPTITYKTLELEIAESDVEVKAELEL  
20 VKVKANEPDEQIKQAEAEVESKQAEATRLKKIKTDREEAEAEAKRRADAKEQKPKGRAKRGVPGELATPDKKEN  
DAKSSDSSVGEETLPSPSLKPEKKVAEAEKKVEAEKKAEDQKEEDRRNYPTNTYKTLELEIAESDVEVKAELELV  
KEEAKEPRNEEKVKQAKAEVESKKAETRLKIKTDREKAEAEAKRKAABEDKVKEKPAEQPOPAPAPKAEKPAAP  
KPENPAEQPKAEKPADQOAEEDYARRSEEEYNRLTQQQPPKTEKPAQPSPTPKTGWKQENGWYFYNTDGSMTAGWLQ  
NNGSWYYLNSNGAMATGWLQNGSWYYLNSNGSMATGWLQNGSWYYLNSNGSMATGWLQYNGSWYYLNSNGSMATG  
25 WLQYNGSWYYLNSNGDMATGWLQDGTWYYLEASGAMKASQWFKVSDKWYYVNGSGALAVNTTVDGYGVNANGEWVN  
Z

**ID303**

ATGGTAAAAAGACGTATAAGGAGAGGGACGAGAGAACCTGAAAAAGTTGTTGTTCTGAGCAATCATCTATTCCTTC  
GTATCCTGTATCTGTTACATCTAACCAAGGAACAGATGTAGCAGTAGAACCAGCTAAAGCAGTTGCTCCAACAACAG  
30 ACTGGAAACAAGAAAAATGGTATGTGGTATTTTTATAATACTGATGGTTCCATGGCAACAGGTTGGGTACAAGTTAAT  
AGTTTCATGGTACTACCTCAACAGCAACGGTTCTATGAAAGTCAATCAATGGTTCCAAGTTGGTGGTAAATGGTATTA  
TGTAATAACATCGGGTGAGTTAGCGGTCAATACAAGTATAGATGGCTATAGAGTCAATGATAATGGTGAATGGGTGC  
GTTAA

35 MVKRRIRRGTRPEKVVVPEQSSIIPSYPVSVTSNOGTDVAVEPAKAVAPTTDWKQENGWYFYNTDGSMTAGWVQVN  
SSWYYLNSNGSMKV/NQWFQVGGKWYYVNTSGELAVNTSIDGYRVNDNGENVVZ

**ID304**

40 CTGAATACAAAGTTTGTTCATGCTGCTGATGGGATTCATATGTGAGAGATGATACTAGAGATAAAGAGAGGGAAT  
AGAGTATGATGACGCTGACAATGGGGATATTATTGTAAGTAGCGACTAAACCTAAGGTAGTAACCAAGAAAAATTT  
CAAGTACGCGAATTGTTATGAAAAAGATGAAACAAAGACCGTAGTGAAATCCTGTTACAATTGATGGAGAGGAT  
GGCTATGTAACTACGACAAGGACCTACGATGTTAATCCAGAGACTGGTTATGTTACCGAACAGGTTACTGTTGATAG  
AAAAGAAGCCACGGATACAGTTATCAAAGTTCAGCTAAAAGCAAGGTTGAAGAAGTTCTTGTTCATTGCTACTA  
AATATGAAGCAGACAATGACCTTTCTGCAGGACAGGAGCAAGAGATTACTCTAGGAAAGAATGGGAAAAACAGTTACA  
45 ACGATAACTTATAATGTAGATGGAAAGAGTGACAAAGTAACTGAGAGTACTTTAAGTCAAAAAAAGACTCTCAAAC  
AAGAGTTGTTAAAAAAGAACCAAGCCCCAAGTTCTTGTCAGAAATTCRAATCGAAACAGAATATCTCGATGGCC  
CAACTCTTGATAAAAGTCAAGAAGTAGAAGAAGTAGGAGAAATTGGTAAATTACTCTTACTACAATCTATAGTGTAG

50 LNTSFVHAADGIQYVRDDTRDKEEGIEYDDADNGDIIVKVATKPKVVTKKISSTRIRYEKDETORSNENFVTTIDGED  
GYVTTTTRTYDVNPETGYVTEQVTVORKEATDTVIKVPKSKVEEVLVPFATKYEADNDLSAGQEIEITLGKNGKTVT  
TITYNVDGKSGQVTESTLSQKKDSQTRVVKRTPQVLVQEIPIETEYLDGPTLDKSKQEVEVEIGEKLQLLSILZ

**ID305**

55 ATGAAGCTTTTGAAAAAATGATGCAAAATCGCACTAGCCACATTTTTCTCGGTTTGTAGCGACAAATACAGTATT  
TGCAGATGATTCTGAAGGATGGCAGTTTGTCCAAGAAAAATGGTAGAACCTACTACAAAAGGGGGATCTAAAAGAAA  
CCTACTGGAGAGTGATAGATGGGAAGTACTATTATTTTGATCCTTTATCCGGAGAGATGGTTGTCCGGCTGGCAATAT  
ATACCTGCTCCACACAAGGGGTTACGATGGTCTCTCCAGAATAGAGATTGCTCTTAGACAGATGGTTGTTT  
60 TTTTGGTCAAGATGGTGTATTACAAGAATTTGTTGGCAAGCAAGTTTGAAGCAAAAAGTCTACGAATACCAACA  
AACATCATGGGGAAGAATATGATAGCCAAGCAGAGAAACAGTCTATTATTTGAAGATCAGCGTAGTTATCATACT

5 TAAAAAATCGTTGGATTATGAAGAGGGTCATTGGTATTATTACAGAAGGATGGTGGCTTTGATTCCGCGCATCAA  
CAGATTGACGGTTGGAGAGCTAGCACGTGGTGGGTTAAGGATTACCTCTTACGTATGATGAAGAGAAGCTAAAAG  
CAGCTCCATGGTACTATCTAAATCCAGCAACTGGCATTATGCAAACAGGTTGGCAATATCTAGGTAATAGATGGTAC  
TACCTCCATTGGTCAGGAGCTATGGCAACTGGCTGGTATAAGGAAGGCTCAACTTGGTACTATCTAGATGCTGAAAA  
TGGTGATATGAGAACTGGCTGGCAAAACCTTGGGAACAAATGGTACTATCTCCGTTTATCAGGAGCTATGGCAACTG  
GTTGGTATCAGGAAAGTTGCACTTGGTACTATCTAAATGCAAGTAATGGAGATATGAAAAACAGGCTGGTTCCAAAGTC  
AATGGTAACTGGTACTATGCCTATGATTAGGTCGTTTACGCTGTTAATACCACAGTAGGTGGTTACTACTTAAACTA  
TAATGGTGAATGGTTAAGTAA

10 MKLLKQMMQIALATFFFGLLATNTVFADDSEGWFQVQENGRYYKKGDLKETWYRVIDGKYYYFDPLSGEMVVGWQY  
IPAPHKGVITGSPRIEIALRPDWFYFGQDGLQEFVGKQVLEAKTATNTNKHGEEYDSQAEKRVYVYFEDQRSYHT  
LKTGWIIYEEHWWYLLQDGGFDSRINRLTVGELARGWVKDYPLTYDEEKLKAAPWYLLNPATGIMQGTWQYLCNRWY  
YLHSSGAMATGWYKEGSTWYLLDAENGDMRTGWQNLGNKWYLLRSSGAMATGWYQESSTWYLLNASNGDMKTGWQV  
NGNWYYAYDSGALAVNTTVGGYLLNYNGEWWKZ

15 ID306  
TTGGCTGGTAGATATGGTCTGCTGTTTCACTGTACAGAAGTACTGCCTCAAACCTTTCAACAGTTAAAACTAAAGC  
TACGGTTGTAGAAAAACCACTGAAAGATTTTAGAGCGTCTACGTCTGATCAGTCTGGTTGGGTGGAATCTAATGGTA  
AATGGTATTTCTATGAGTCTGGTGAATGGAAGACAGGTTGGGTGAAAAACAGATGGTAAATGGTACTATTTGAATGAC  
TTAGGTGTCTGAGACTGGATTTGTAATAATTTCTGGTAGCTGGTATTACTTGAAGCAATTAGGCTCTATGTTTAC  
AGGCTGGGGAACAGATGGTAGCAGATGGTCTACTTTGACGGCTCAGGAGCTATGAAGACAGGCTGGTACAAGGAAA  
ATGGCACTTGGTATTACCTTGACGAAGCAGGTATCATGAAGACAGGTTGGTTTAAAGTCGGACCACTGGTACTAT  
GCCTACGGTTTCAAGGAGCTTTGGCTGTGAGCACAAACACCATGAGTGGTTACCGTGTAAATGGTAAATGGTGAATGGGT  
AAACTAG

25 LAGRYGSAVQCTEVTASNLSVTKRATVVEKPLKDFRASTSDQSGWVESNGKWYFYESGDVKTGWVKTGDKWYLLND  
LQVMQTFGVKFSQSWYLLSNSGAMFTGWGTDGSRWFYFDGSGAMKTGWYKENGWYLLDEAGIMKTGWFKVGPWY  
AYGSGALAVSTTTPDGYRVNGNGEWWNZ

30 ID307  
ATGAAAAATTTGAAAAAACTATGCAAGTTGGACTGACAGTATTTTCTTTGGTTTGGCTAGGGACCAGTACAGTATT  
TGCAGATGATTCTGAAGGATGGCAGTTTGTCCAAGAAAAACGAAGAACCTACTACAAAAAGGGGACCTCAAAGAAA  
CCTACTGGCGAGTGATTGATGGTAAGTACTATTATTTGATTCTCTATCTGGAGAGATGGTTGTGGCTGGCAATAT  
ATCCCGTTTCCATCTAAAGGTAGTACAAATGGTCTTACCCTAAATGGTATCAGATTAGAAGGTTTCCAAAGTCAGA  
35 GTGGTACTACTTCGATAAAAAATGGAGTGCTACAAGAGTTTGTGGTTGGAAAAACATTAGAGATTAAAACTAAAGACA  
GTGTTGGAAGAAAGTACGGGGAACAACTGAAGATTGAGAAGATAAAGAAGAGAAGCGTTATTATACGAATATTAC  
TTAATCAAAATCATTCTTTAGAGACAGGTTGGCTTTATGATCAGTCTAACTGGTATTATCTAGCTAAGACGGAAT  
TAATGGAGAAAACTACCTTGGTGGTGAAGACGTGCGGGGTGGATAAACGATGATTGCACTTGGTACTACCTAGATC  
CAACAACTGGTATTATGCAACAGGTTGGCAATATCTAGGTAATAAGTGGTACTACCTCCGTTTCTCAGGAGCAATG  
40 GCCACTGGCTGGTATCAGGAAGGTACCACTTGGTATTATTAGACCACCCAAATGGCGATATGAAAAACAGGTTGGCA  
AAACCTTGGGAACAAATGGTACTATCTCCGTTTATCAGGAGCTATGGCAACTGGTTGGTATCAAGATGGTTCAACTT  
GGTACTACCTAAATGCAGGTAATGGAGACATGAAGACAGGTTGGTTCCAGGTCAATGGCAACTGGTACTATGCTTAT  
AGCTCAGGTGCTTTGGCAGTGAATACGACCGTAGATGGCTATTCTGTCACTATAATGGCGAATGGGTTCCGTAA

45 MKILKKTMOVGLTVFFGLLTSTVFADDSEGWFQVQENGRYYKKGDLKETWYRVIDGKYYYFDSLSEGMVVGWQY  
IPFPSKSTIGPYPNGIRLEGPPKSEWYFDKNGVLQEFVGWKTLEIKTKDSVGRKYGEKREDSSEKSEKRYTNY  
FNQNHSLGTWLYDQSNWYLLAKTEINGENYLGERRAGWINDDSTWYLLDPTTGIMQGTWQYLLGNKWYLLRSSGAM  
ATGWYQEGTTWYLLDHPNGDMKTGWQNLGNKWYLLRSSGAMATGWYQDGSWYLLNAGNGDMKTGWQVNGNWYAY  
50 SSGALAVNTTVDGYSVNYNGEWWVRZ

ID308  
ATGAAAAAGAAATTAAGTATTAGCACTTGTAGGCGCTTTTTTAGGTTTGTCTAGGTATGGGAATGTTTCAAGCTCA  
AGAAAGTTTCAAGAAATAAATCCACTTTATCAATGTTCAAGAAGGTGGCAGTGATGCGATTATTCTTGAAGCAATG  
55 GACATTTTGGCATGGTGGATACAGGAGAAGATTATGATTTCCAGATGGAAGTGATTCTCGCTATCCATGGAGAGAA  
GGAATTTGAAACGTCTTATAAGCATGTTCTAACAGACCGTGTCTTTCGTCTGTTGAAGGAATTGGGTGTCCAAAACT  
TGATTTTATTTTGGTGACCCATACCCACAGTGATCATATTGGAATGTTGATGAATTACTGTCTACCTATCCAGTTG  
ACCGAGTCTATCTTAAGAAATATAGTGATAGTCTGATTACTAATCTGAAAGCTCTATGGGATAATCTGATGGCTAT  
60 GATAAGGTTTTACAGACTGCTGCAGAAAAAGGTGTTTCACTTATCAAAATATCACACAAGGGGATGCTCATTTTCA  
GTTTGGGGACATGGATATTAGCTCTATAATTATGAAATGAACTGATTCTCGGTGAATTAAGAAAAATTTGGG

ATGACAATTCCAATTCCTTGATTAGCGTGGTGAAAGTCAATGGCAAGAAAATTTACCTTGGGGGCGATTAGATAAT  
GTTTCATGGAGCAGAAGACAAGTATGGTCCTCTCATTGGAAAAGTTGATTGGATGAAGTTTAATCATCACCATGATAC  
CAACAAATCAAATACCAAGGATTTCAATAAAATTTGAGTCCGAGTTTGATTGTTCAAACCTTCGGATAGTCTACCTT  
5 GGAAAAATGGTGTGTGATAGTGAGTATGTTAATTGGCTCAAAGAACGAGGAATGAGAGAATCAACGCAGCCAGCAAA  
GACTATGATGCAACAGTTTTGTATTCGAAAAGACGGTTTTGTCAATATTTCAACATCCTACAAGCCGATTCCAAG  
TTTTCAAGCTGGTTGGCATAAGAGTGATATGGGAACGGTGGTATCAAGCGCCTGATTCTACAGGAGAGTATGCTG  
TGGGTGGAAGATAAAGAAACCTGGTACTATATGGATTCTACTGGTGTCAAGAGCAGGTGAGATAGAAGTTGCTGG  
10 TGGAAACAATCATTGGTTCTATTTGACAGACTCTGGTGGTCTGCTAAAAATTTGAAGAAAATCGCTGGAATCTGGTA  
TTATTTTAAACAAAGAAAACAGATGGAATTTGGTGGATTCAAGATAAAGAGCAGTGGTATTATTTGGATGTTGATG  
GTTCTATGAAGACAGGATGGCTTCAATATATGGGGCAATGGTATTACTTTGCTCCATCAGGGGAAATGAAAATGGGC  
TGGATAAAGATAAAGAAACCTGGTACTATATGGATTCTACTGGTGTCAAGAGCAGGTGAGATAGAAGTTGCTGG  
TCAACATTATTATCTGGAAGATTGAGGAGCTATGAAGCAAGGCTGGCATAAAAGGCAATGATTGGTATTCTTACA  
AGACAGACGGTTCACGAGCTGTGGTTGGATCAAGGACAAGGATAAATGGTACTTCTTGAAGAAAATGGTCAATTA  
15 CTGTGTAACGGTAAGACACCAGAGGTTATCTGTGGATTCAAGTGGTGCCTGGTTAGTGGATGTTTCGATCGAGAA  
ATCTGCTACAATTAACACTACAAGTCATTAGAAATAAAAGAAATCAAAGAAGTAGTGAAGAAAGGATCTTGAATA  
AAGAAACGAGTCAACATGAAAGTGTACAAATTTTCAACTAGTCAAGATTGACATCCTCACTTCACAAAGCTCT  
GAAACGAGTGTAAACAAATCGAATCAGAACAGTAG

MKKQLTSLALVGAFLGLSWYGNVQAQESSGNKIHFINVQEGGSDAIILESNGHFAMVDTGEDYDFPDGSDSRYPWRE  
20 GIETSYKHVLTDRVFRRLKELGVQKLDLILVTHSDHIGNVDELLSTYPVDRVYLKYSRITNSERLWNLVGY  
DKVLQTAEEKGVSVIQNITQGDHAFQFGMDIQLYNYENETDSSGELWKIWDNNSNLSIVVKVNGKKIYLGDLON  
VHGAEDKYGPLIGKVDLMKFNNHHDNTKSNKDFIKNLSPLIVQTSDSLWKNGVDSEYVNWLERGIERINAASK  
DYDATVFDIRKDGFNISTSYKPIPSFQAGWHKSAYGNWYQAPDSTGEYAVGWNEIEGEWYFFNQGITLLQNWKK  
25 WNNHWFYLTDSGASAKWKKIAGIWIYFNKENQMEIGWIQDKEQWYLLVDGSMKTGWLQYMGWYFAPSGEMKMG  
WVKDKETWYMDSTGVMTGEIEVAGQHYLLEDSGAMKQGWKKANDWYFYKTGDSRAVGWIKDKKWYFLKENGQL  
LVNGKTPEGYTVDSGAWLVDVSIKESATIKTSHSEIKESKEVVKDLNKTESQESVTNFSTSQDLTSSTSQSS  
ETSVNKSESEQZ

**ID309**  
30 ATGGAATTAATGTGAGTAAATTAAGAACAGATTGCGCTCAAGTCGGCGTGCAACCATATAGGCAAGTACACGCACA  
CTCAACTGGGAATCCGCATTCAACCGTACAGAAATGAAGCGGATTACTGCGCGAAAGACCAGAAATAGGTTTTT  
TCTCGCACATTGTTGGGAACGGTTGCATCATGCGAGTAGGACCTGTTGATAATGGTGCCTGGGACGTTGGGGCGGT  
TGGAAATGCTGAGACCTATGCAGCGGTTGAAGTGAAGTGAAGCAATTAACCAAGAAAGAGTTTATGACCGGACTACCG  
35 CTTTATATCGAACTCTTACGCAATCTAGCAGATGAAGCAGGTTTGCCGAAAACGCTTGATACAGGAGTTTAGCTG  
GAATTAACAGCAGAGTATTGCACGAATAACCAACCAACCACTCAGACCAGTTGACCTTATCCATATCTT  
GCTAAATGGGGCATTAGCGGTGAGCAGTTAAGCATGATATTGAGAACGGCTTGACGATTGAAACAGGCTGGCAGAA  
GAATGACACTGGCTACTGGTACGTACATTGACAGCGCTCTTATCCAAAGACAAGTTTGAGAAAATCAATGGCACTT  
GGTACTACTTTGACAGTTCAAGGCTATATGCTTGCAGACCGCTGGAGGAAGCACACAGACGGCACTGGTACTGGTTC  
40 GACAACTCAGGCGAAATGGCTACAGGCTGGAAGAAAATCGCTGATAAGTGGTACTATTTCAACGAAGAAGGTGCCAT  
GAAGACAGGCTGGGTCAAGTACAAGGACACTTGGTACTACTTAGACGCTAAAGAAGCGCCATGGTATCAATGCCT  
TTATCCAGTCAAGCGGACGGAACAGGCTGGTACTACCTCAAACAGACGGAACACTGGCAGACAAGCCAGAATTACA  
GTAGAGCCAGATGGCTTGATTACAGTAAATAA

MEINVSILRTDLPOVGVPYRQVHAHSTGNPHSTVQNEADYHWRKDPELGFFSHIVGNGCIMOQVGPVNDGAWDVGGG  
45 WNAETYAARELIESHSTKEEFMTDYRLYIELLRNLADEAGLPKTLDTGSLAGIKTHEYCTNNQPNHSDHVPYPYL  
AKNGISREQFKHDIENGLTIEGWQKNDTGYYVHSDGSYPKDKFEKINGTWYFDSSGYMLADRWRKHTDGNWYWF  
DNSGEMATGWKKIADKWYFNEEGAMKTGWYKYKDTWYLLDAKEGAMVSNAFIQSADGTGWYLLKPDGTLADKPEFT  
VEPDGLITVKZ

**ID310**  
50 ATGGGCACACAGGATTACAATAATTGACTTAATTACTTGATTGTTTATTTACTTGGGTGTTGGTTGCAGGTAT  
CTATTTCTCTAAAAAGAGATGAAAGGAAAAGAGTTCTTAAAGGAGATGGTTCGGTTCTTGGTATGTTACTTCGG  
TATCCATTTTTGCCACAATGCTCAGTCCGATTTCCTTCTGGGACTCGCTGGTAGCTCTTATGACAGGTAGCTGGATT  
TTATGGTTTGTCTCAATTAGGGATGGTAGCTATTCACCTGACAATTCGTTTTATCTTACCTATCTTTGCAGCGAT  
55 AGACATCGATACGGCATATGATTACTTGGATAAACGTTTTAATCTAAAGCACTTCGTATTATTTGACGACTCTTG  
TTATTATTTATCAATTGGGACGTATGCTATCATTATGTACCTCCCATCAGCTGGTTTATCAGTATTGACAGGAATT  
GACATCAATATTTGATTATTTGATGGGTGATGTTGCAATGTTTATTCTTATACTGGTGGTCTAAAATCCGTATT  
ATGGACAGACTTTATTCAAGGTGTGATTCTGATTAGTGGTGTGTTTTAGCTTTATTTGACTGATTGCTAATATTA  
AAGGTGGCTTTGGTGCAGTAGCAGAAACATTAGCAACCGGAAATTCCTTGTCTGCAATGAAAACCTTTTCGATCCT  
60 AACTTGCTTTCAACTCCATCTTTTAAATGTGATGGGTTTCAAGCTTTTCAATCTTGTCTTCTATGCTTCATCTCA



AGATTTGGTTCAACGTTTTACTACAACACAAAATATTAAGAACTTAATAAGATGTTGTTTCACAAACGGTGTGTTTGT  
CACTTGCAACTGCAACAGTCTTTTACTTGATTGGTACAGGCTGTACGTATTCTATCAAGTACAAAATGCAGATAGT  
GCAGCTAGCAATATCCCTCAAGACCAAATCTTTATGTACTTTATTGCATACCAGTTACCAGTAGGTATCACAGGTTT  
5 GATCTTGGCAGCGATTTATGCAGCATCTCAATCAACTATTTCAACAGGTTTGAACCTCTGTTGCAACTTCATGGACAT  
TGGATATTCAAGATGTCAATTTCTAAAAATATGTCAGACAATCGTCGTACGAAAAATTCACAATTCGTATCTCTAGCA  
GTAGGTTTATTCTCAATTGGTGTTCATGTGTCATGGCTCACTCAGATATTAAATCTGCATACGAATGGTTCAATAG  
TTTCATGGGACTTGTACTTGGTCTACTTGGTGGTGTATTATTCTTGGATTGTTTTCTAAAAAGCAAATAAACAAAG  
GTGCTTATGCAGCGCTGATTGTATCAACCATCGTCATGGTATTTATTAAATACTTCTCTCCAACAGCTGTTAGC  
10 TACTGGGCATATTCAATTGATTTCAATCTCTGTATCAGTAGTTTCAGGTTATATTGTATCTGTTCTTACTGGAATAA  
AGTATCTGCACCTAAATATACAACGATTATGATATTACAGAAATTAAGCGGATTCAAGTTGGGAAGTTCGTCACT  
AA

MGTTGFTIIDLIILIVYLLAVLVAGIYFSKKEMKGKEFFKGDGSPVWYVTSVSI FATMLSPI SFLGLAGSSYAGSWI  
LWFAQLGMVVAIPLTIRFILPIFARIDIDTAYDYLDKRFNSKALRIISALLFIYQLGRMSIIMYLPSAGLSVLTGI  
15 DINILIILMGVVAIVYSYTGGLKSVLWTFIQGVILISGVVLALFVLIANI KGGFGAVAETLANGKFLAANEKLFDP  
NLLSNSIFLIVMGSGFTILSSYASSQDLVQRFTTTQNIKKLNKMLFTNGVLSLATATVFFYLGITGLYVFFYQVONADS  
AASNIPQDQIFMYFIAYQLPVGITGLILAAIYAASQSTISTGLNSVATSWTLDIQDVISKNWSDNRRTKIAQFVSLA  
VGLFSIGVSI VMAHSDIKSAYEFNSFMGLVLGLLGGVFILGFVSKKANKQAYALIVSTIVMVFIKYFLPPTAVS  
YWAYSLSISISVSUVSGYIVSVLTGNKVSAPKYTTIHDI TEIKADSSWEVRHZ  
20

### ID311

ATGAAAAATTAATAAAAAATATCTAGCAGGTTCACTGGCAGTCCTTGCCCTAAGTGTGTTGTTCTATGAGCTTGGTGG  
TCACCAAGCTGGTCAGGATAAGAAAGAGTCTAATCGAGTTGCTTATATAGATGGTGATCAGGCTGGTCAAAGGCAG  
25 AAAACCTTGACACAGATGAAGTCAGTAAGAGGGAGGGGATCAACGCCGAACAAATCGTCATCAAGATTACGGATCAA  
GGTTATGTGACCTCTCATGGAGACCATTATCATTACTATAATGGCAAGGTCCTTATGATGCCATCATCAGTGAAGA  
GCTCCTCATGAAAGATCCGAATTATCAGTTGAAGGATTAGACATTTGCAATGAAATCAAGGGTGGTTATGTCATCA  
AGGTAGACGGAAAAATCTATGTTTACCTTAAGGATGCAGCTCATGCGGATAATATTCGGACAAAAAGAGAGATTAA  
CGTCAGAAGCAGGAACGCAGTCATAATCACGGGTGAGGAGCTAACGATCATGCAGTAGCTGCAGCCAGAGCCCAAG  
30 ACGCTATACAACGGATGATGGGTATATCTTCAATGCATCTGATATCATTGAGGACACGGGTGATGCTTATATCGTTC  
CTCACGGCGACCATTACCATTAATCCTAAGAAATGAGTTATCAGCTAGCGAGTTAGCTGCTGCAGAAGCCTATTGG  
AATGGGAAGCAGGGATCTCGTCTCTTCAAGTTCTAGTTATAATGCAAAATCCAGCTCAACCAAGATTGTCAGAGAA  
CCACAATCTGACTGTCACTCCAACCTATCATCAAAATCAAGGGGAAAAACATTCAAGCCTTTTACGTGAATTGTATG  
CTAAACCCCTTATCAGAACGCCATGTGGAATCTGATGGCCTTATTTTCGACCCAGCGCAAAATCAAGTCGAACCCGC  
35 AGAGGTGTAGCTGTCCCTCATGGTAACCATTAACCACTTATCCCTTATGAACAAATGTCTGAATTGGAAAAACGAAT  
TGCTCGTATTATCCCTTCTGTTATCGTTCAAACCATTTGGGTACCAGATTCAAGACCAGAACCAAGTCCACAAT  
CGACTCCGAACCTAGTCCAAGTCCGCAACCTGCACCAATCCTCAACAGCTCCAAGCAATCCAATTGATGAGAAA  
TTGGTCAAGAAGCTGTTGCAAAAGTAGGCGATGTTATGCTTTGAGGAGAATGGAGTTTCTCGTTATATCCCAAGC  
CAAGGATCTTTGAGCAGAAACAGCAGCAGGCATTGATAGCAAACTGGCCAAAGCAGGAAAGTTTATCTCATAAGCTAG  
40 GAGCTAAGAAAACTGACCTCCCATCTAGTGATCGAGAATTTTACAATAAGGCTTATGACTTACTAGCAAGAAATTCAC  
CAAGATTACTTGATAATAAAGGTGCAACAAGTTGATTTTGAAGCTTTGGATAACCTGTTGGAACGACTCAAGGATGT  
CCCAAGTGATAAAGTCAAGTTAGTGGATGATATCTTGCCTTCTTAGCTCCGATTCTGTCATCCAGAACGTTTAGGAA  
AACCAAATGCGCAAAATACCTACACTGATGATGAGATTCAAGTAGCCAAGTTGGCAGGCAAGTACACAACAGAAAGAC  
GGTTATATCTTTGATCCTCGTGATATAACCAAGTATGAGGGGATGCCTATGTAACCTCCACATATGACCCATAGCCA  
45 CTGGATTAAAAAGATAGTTTGTCTGAAGCTGAGAGAGCGGCAGCCAGGCTTATGCTAAAGAGAAAGGTTTGACCC  
CTCCTTCGACAGACCATCAGGATTCAGGAAATCTGAGGCAAAAGGAGCAGAAGCTATCTACAACCGCGTGAAAGCA  
GCTAAGAAGGTGCCACTTGATCGTATGCCTTACAATCTTCAATATACTGTAGAAGTCAAAAACGGTAGTTTAAATCAT  
ACCTCATTATGACCATTACCATAACATCAAATTTAGTGTTTGAAGGAGCCTTATGAGGCACCTAAGGGGTATA  
CTCTTGAGGATCTTTTGGCGACTGTCAAGTACTATGTCGAACATCCAAACGAACGTCGCTTATCAGATAATGGTTTT  
50 GGTAAACGCTAGCGACCATGTTCAAAGAAACAAAAATGGTCAAGCTGATACCAATCAAACGGAAAAACCAAGCGAGGA  
GAAACCTCAGACAGAAAAACCTGAGGAAGAAACCCCTCGAGAAGAGAAACCGCAAGCGAGAAACCAAGATCTCCAA  
AACCACAGAGGAACCAAGAAGATCACCAGAGGAATCAGAAGAACCTCAGGTCGAGACTGAAAAGGTTGAAGAAAA  
CTGAGAGAGGCTGAAGATTTACTTGGAAAAATCCAGGATCCAATTATCAAGTCCAATGCCAAAGAGACTCTCACAGG  
ATTAATAAAATATTTACTATTGGCACCCAGGACAACAATACTATTATGGCAGAAGCTGAAAACTATTGGCTTTAT  
55 TAAAGGAGAGTAAGTAA

MKINKKYLGSVAVLALSVCSYELGRHQAGQDKKESNRVAYIDGDQAGQKAENLTPDEVSKREGINAEQIVIKITDQ  
GYVTSHGHDHYHYNGKVPYDAIISEELLMKDPNYQLKDSIDVNEIKGGYVIKVDGKYVYVVKDAAHADNIRTKKEIK  
RQKQERSHNHSGSANDHAVAARAQGRYTTDDGYIFNASDIIEDTGDAYIVPHGDHYHYIPKNELASASELAAEAAYW  
60 NGKQGRPSSESSSYNANPAQPRLSNHLTVPTYHQNGENISSLLRELYAKPLSERHVESDGLIFDPAQITSRTA  
RGVAVPHGNHYHFIPEYQMSLEKRIARIIPLYRSNHWVPDSRPEQSPQSTPEPSPPQAPNPQAPSNPIDEX

5 LVKEAVRKVG DGYVFEENGVSRYI PAKDLSAETAAGIDSKLAKQESLSHKLGAKKTDLPSSDREFYNKAYDLLARIH  
QDLLDNKGRQVDFEALDNLLERLKDVP SDKVKLVDDILAF LAPIRHPERLGKPNQIITYTDD EIQVAKLAGKYTTED  
GYIFDPRDITSDEGDAYVTPHMTSHHWIKKDSLSEAEERAAQAYAKEKGLTPSTDHQDSGNT EAKGAEAIYNRVKA  
AKKVP LDRMPYNLQYTV EVKNGSLIIPHYDHYHNIKFEWFDEGLYEAPRGYTTLEDLLATVKYVVEHPNERPHSDNGF  
GNASDHVQRNKGQADTNQTEKPSZEKPQTEKPEEETPREEKPOSEKPESPKPTEEPESPEESEEPQVETEKVSEK  
LREAEDLLGKI QDPIIKSNAKETLTGLKNLLFGTQDNNTIMAEAEKLLALLKESKZ

10 ID312  
ATGGAGGGATTGGTTAGAGTGCA TTTATTGCCTGTATTTGGCGATTACAAGCTATCTAAACTTACTACGCCTATTCT  
TCAACAGCAAGTAAACAAATGGGCTGACAGGCAAATAAAGGCGAAAAAGGGGCATTTGCTAACTACTCTTTGCTCC  
ATAACATGAATAAGCGTATTTGAAATATGGCGTAGCTATCCAGGTAATACAATACAACCCAGCTAATGATGTCATC  
GTTCCACGCAAAACAGCAAAAAGAAAAGGCTGCTGTCAAATACTTAGACAACAAGAATTAAAAACAGTTTCTTGATTA  
TTTAGATGCTCTGGATCAATCAAATTATGAGAACTTATTTGATGTTGTTCTGTATAAGACTTTATTGGCCACTGGTT  
15 GCCGTATTAGTGAGGCTCTGGCTCTTGAATGGTCTGATATTGACCTAGAAAGCGGTGTTATCAGCATCAATAAGACA  
CTAAACCGCTATCAGGAAATAAACTCACTAAATCAAGCGCTGGTTATCGTGATATACCAATAGACAAAGCCACATT  
ACTTTTACTGAAACAATACAAAAACCGTCAACAAATTCAGTCTTGAAATTAGGCCGATCTGAAACAGTTGTATTCT  
CTGTATTTACGGAGAAATATGCTTATGCTTGTAACCTACGCAACGCCTAAATAAGCATTTTGATGCTGCTGGAGTA  
ACTAACGTATCATTTTCATGGTTTCCGCCATACACATACTACTATGATGCTCTATGCTCAGGTTAGCCCGAAAGATGT  
20 TCAGTATAGATTAGGCCACTCTAATTTAATGATCACTGAAATACTTACTGGCATACTAACCAAGAGAATGCAAAAA  
AAGCGTCTCAAATTATGAAACAGCTATCAACAATTTATAA

25 MEGLVRVHLLPVFGDYKLSKLTTPILQQQVNKWADKANKGEKGA FANYSLHNMNKRILKYGVAIQVIQYNPANDVI  
VPRQOQKEKA AVKYL DNKELKQFLDYLDALDQSNYENLFDVVL YKTL LATGCRISEALALEWSDIDLESGVISINKT  
LNRYQEINS PKSSAGYRDIPI DKATLLLLKQYKNRQIQSWKLRSETVVFV FTEKYAYACNLKRKLNKHFDAAGV  
TNVSFHGFRHTHTTMMLYAQVSPKDVQYRLGHSNLMITENTYWHTNQENAKKAVSNYETA INNLZ

## CLAIMS:

1. A *Streptococcus pneumoniae* protein or polypeptide having a sequence selected from those shown in table 2.
2. A *Streptococcus pneumoniae* protein or polypeptide having a sequence selected from those shown in table 4.
3. A protein or polypeptide as claimed in claim 1 or claim 2 provided in substantially pure form.
4. A protein or polypeptide which is substantially identical to one defined in any one of claims 1 to 3.
5. A homologue or derivative of a protein or polypeptide as defined in any one of claims 1 to 4.
6. An antigenic and/or immunogenic fragment of a protein or polypeptide as defined in Tables 2-4.
7. A nucleic acid molecule comprising or consisting of a sequence which is:
  - (i) any of the DNA sequences set out in Table 1 or their RNA equivalents;
  - (ii) a sequence which is complementary to any of the sequences of (i);
  - (iii) a sequence which codes for the same protein or polypeptide, as those sequences of (i) or (ii);

- (iv) a sequence which is substantially identical with any of those of (i), (ii) and (iii);
- 5 (v) a sequence which codes for a homologue, derivative or fragment of a protein as defined in Table 1.
8. A nucleic acid molecule comprising or consisting of a sequence which is:
- 10 (i) any of the DNA sequences set out in Table 4 or their RNA equivalents;
- (ii) a sequence which is complementary to any of the sequences of (i);
- (iii) a sequence which codes for the same protein or polypeptide, as those  
15 sequences of (i) or (ii);
- (iv) a sequence which is substantially identical with any of those of (i), (ii) and (iii);
- 20 (v) a sequence which codes for a homologue, derivative or fragment of a protein as defined in Table 4.
9. The use of a protein or polypeptide having a sequence selected from those shown in Tables 2-4, or homologues, derivatives and/or fragments thereof, as an  
25 immunogen and/or antigen.
10. An immunogenic and/or antigenic composition comprising one or more proteins or polypeptides selected from those whose sequences are shown in Tables 2-

4, or homologues or derivatives thereof, and/or fragments of any of these.

11. An immunogenic and/or antigenic composition as claimed in claim 10 which is a vaccine or is for use in a diagnostic assay.

5

12. A vaccine as claimed in claim 11 which comprises one or more additional components selected from excipients, diluents, adjuvants or the like.

10 13. A vaccine composition comprising one or more nucleic acid sequences as defined in Tables 1, 3 or 4.

14. A method for the detection/diagnosis of *S.pneumoniae* which comprises the step of bringing into contact a sample to be tested with at least one protein or polypeptide as defined in Tables 2-4, or homologue, derivative or fragment thereof.

15

15. An antibody capable of binding to a protein or polypeptide as defined in Tables 2-4, or for a homologue, derivative or fragment thereof.

16. An antibody as defined in claim 15 which is a monoclonal antibody.

20

17. A method for the detection/diagnosis of *S.pneumoniae* which comprises the step of bringing into contact a sample to be tested and at least one antibody as defined in claim 15 or claim 16.

25 18. A method for the detection/diagnosis of *S.pneumoniae* which comprises the step of bringing into contact a sample to be tested with at least one nucleic acid sequence as defined in claim 7 or claim 8.

19. A method of determining whether a protein or polypeptide as defined in Tables 2-4 represents a potential anti-microbial target which comprises inactivating said protein or polypeptide and determining whether *S.pneumoniae* is still viable *in vitro* or *in vivo*.

5

20. The use of an agent capable of antagonising, inhibiting or otherwise interfering with the function or expression of a protein or polypeptide as defined in Tables 2-4 in the manufacture of a medicament for use in the treatment or prophylaxis of *S.pneumoniae* infection

1 / 2

POSITIVE RESULTS OF BIOINFORMATICS DNA VACCINE SCREENS  
USING THE PNEUMOCOCCAL CHALLENGE TRIALS 2, 7 AND 8

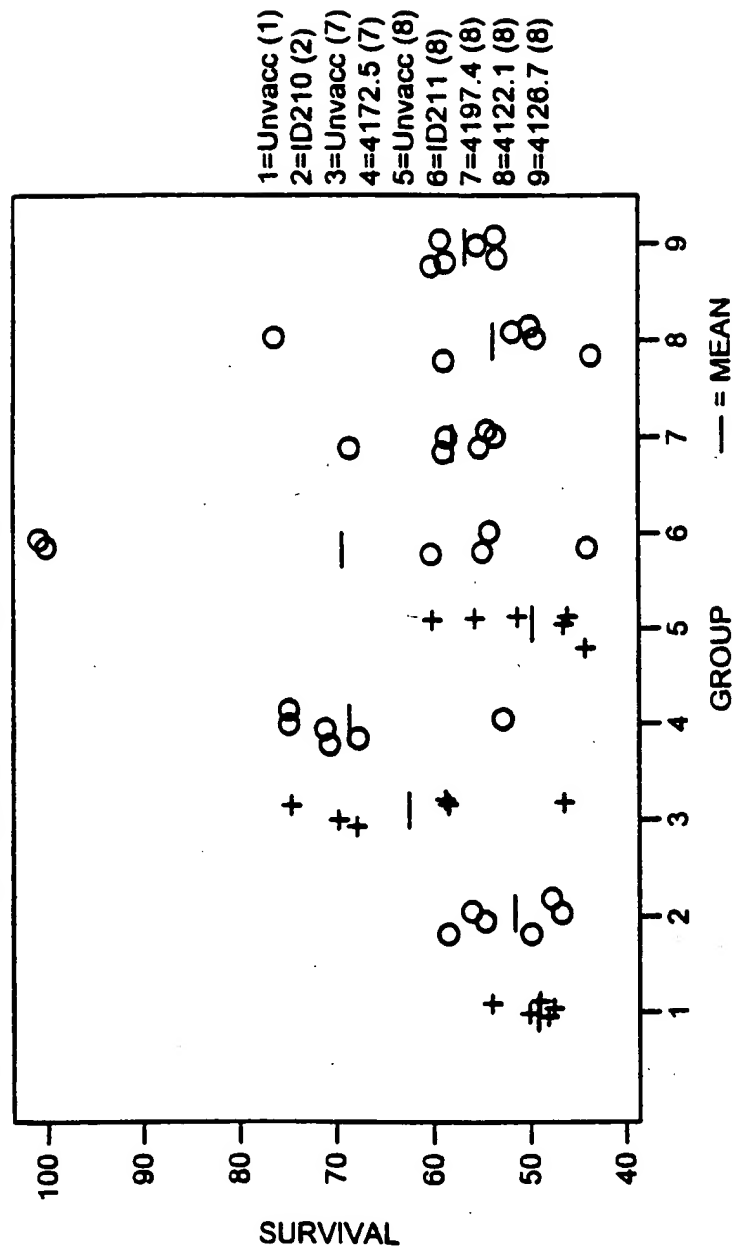


FIG. 1

2 / 2

POSITIVE RESULTS OF BIOINFORMATICS DNA VACCINE SCREENS  
USING THE PNEUMOCOCCAL CHALLENGE TRIALS 9 - 11

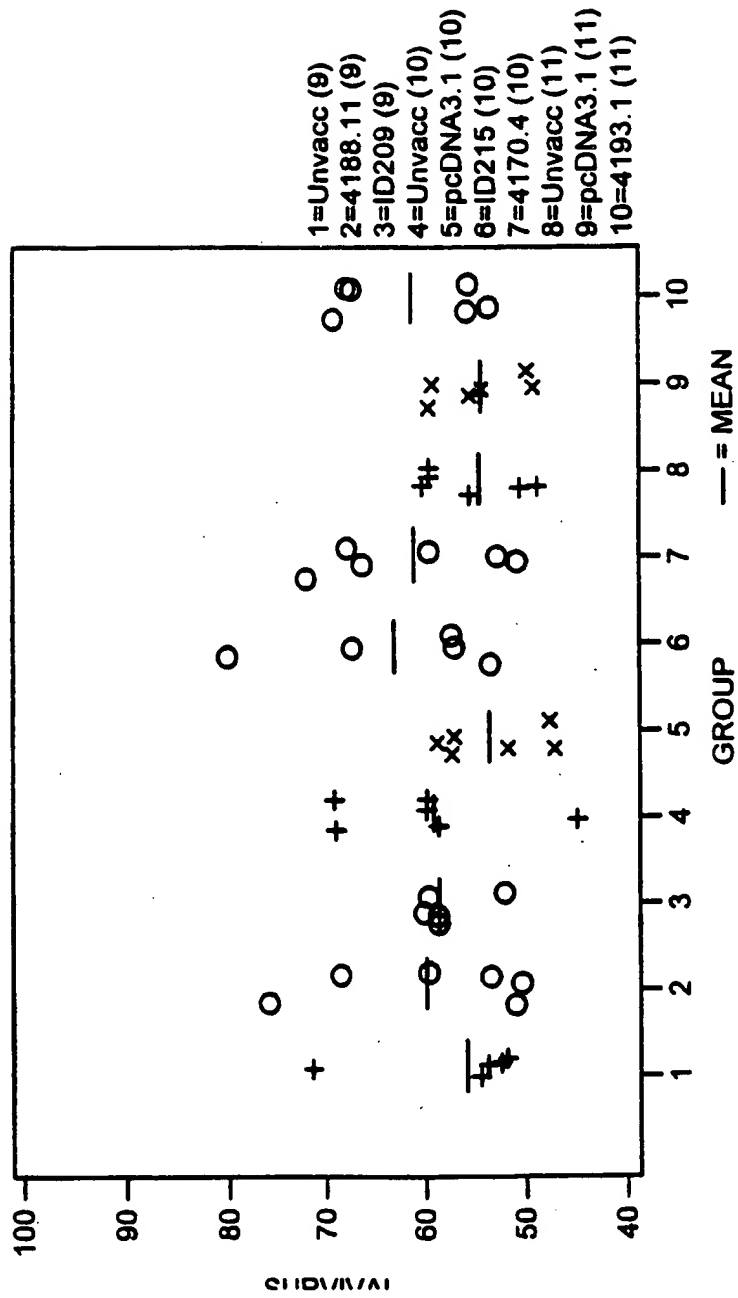


FIG. 2